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LEUCOPLAKIA CERVICIS UTERI AND EARLY CARCINOMA

AN ETIOLOGIC STUDY

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A WELL-DEFINED conception of the etiology and pathogenesis of this group of cellular abnormalities in the uterine cervix of the types now termed "epidermization" and "leucoplakia" and of the factors that predestine the initial lesions, is generally lacking. It is agreed by almost all students of these lesions that they represent cellular hyperplasias of the cervical epithelium, showing definite alteration of cellular morphology. While recognizing the occurrence of "epidermization" and of "leucoplakia" per se as benign lesions, several investigators are inclined to regard, in this domain, unusual epithelial proliferations or cellular irregularities as a propitious background for the development of malignant disease. In consequence, such epithelial changes of a predisposing nature when termed "precancerous" signify conditions which may lead to the later development of cancer; yet without any generalization which would imply that this course of epithelial events is inevitable. The conception that chronic irritation, acting directly upon the cells or upon their local environment, represents an important etiologic factor of these lesions, enjoys a wide popularity. Endocervicitis, particularly subsequent to cervical laceration, procidentia, and presence of polyps rank foremost as causative agents in this group where heteroplastic transformations of columnar cervical epithelium to the stratified squamous type, apparently following repeated stimuli to repair and growth, testify to the profound alteration in char-

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acter of the affected cells. In a certain number of cases leucoplakia of the uterine cervix may represent a manifestation of secondary syphilis. Gellhorn, and some French writers are inclined to allot considerable significance to this etiologic factor while Hinselman's estimate in this respect is rather conservative. The response to hormonal stimuli of the epithelia which cover the vaginal portion and the mucosal surface of the uterine cervix has, in the past, not received the attention which it deserves. Here again, as in other fields of research, the study of pathologic phenomena and the analysis of the effects of altered activity of certain endocrine organs may disclose true physiologic relationships which, up to now, have hardly been surmised.

The present communication records the remarkable influence which increased anterior lobe (hypophyseal) activity exercises over the cervical epithelium and proposes, also, to emphasize the peculiar disposition of the cervical epithelium to undergo metaplastic changes. Several etiologic points of view concerning the incipency of cervical carcinoma are offered.

PATHOLOGY

Whereas former gynecologic literature records a striking paucity of cases of leucoplakia uteri, this condition has recently become a focal point of interest and a prominent subject of inquiry. The widespread attention which now attaches to the subject is principally due to the exhaustive studies of Hinselman who examined a considerable number of excised leucoplakic patches in serial sections and pointed to their clinical significance by emphasizing that all true, slightly elevated leucoplakias observed by him and v. Franqué for sufficient time have, in the course of years, developed malignancy (6 cases); that every cervical carcinoma originates in a leucoplakic plaque; and that the insidious onset of the malignant state may be accounted for by this sequence of events. As a logical deduction from the evidence established, the goal to be attained is the earliest possible recognition of precancerous lesions of the uterine cervix. The search for malignancy is now facilitated by the use of a new instrument, the colposcope. Hinselman claims that, since the introduction of this new device, he has accumulated 160 cases showing leucoplakic patches on the uterine cervix which could not have been detected by the previously used diagnostic methods (palpation, and inspection through the ordinary speculum).

In this country, the recent articles by Ries, Emmert, Martzloff, and Kretschmer, to which the reader is referred, well summarize the present state of knowledge and give excellent descriptions of the histology of the condition under discussion. Its principal microscopic features are: (1) the structure of the leucoplakic areas shows greater density and numbers of cells which take a deeper stain; (2) there is a conspicuous proliferation of the cells in the basal portion of the stratum

mucosum; and (3) there is visible an increased irregularity in shape of the elements of the basal zone, not infrequently associated with a well-defined subepithelial round cell infiltration. Atypical downgrowth of masses of abnormal epithelium into the stroma, in addition to disordered cytology in certain areas, i.e., irregularity in size, shape, and staining reaction, render the formations similar to malignant lesions without invasive growth; the deepest cells, however, do not break the boundary of the basement membrane, in contrast to the manifestation of early malignant change.

In 1911, the author reported at length the gross examination and the microscopic findings of the first case on record of leucoplakia of the cervical mucosa. In this instance, the former presence of a cervical polyp was considered the probable causative factor of the epithelial alteration, no vestige of syphilitic infection having been detectable. It was pointed out by him that leucoplakia of the uterine cervix presents a picture essentially like leucoplakia in other mucous membranes, the scattered white patches of thickened squamous epithelium being found rather sharply outlined. The appearance of the inner aspect of the cervix uteri in this instance was comparable to "pieces of skin transplanted into the cervical mucosa." v. Franqué, in 1907, presented the first thorough description of leucoplakic patches on the mucosa of the vaginal portion, while in our observation, slightly elevated, rather prominent, sharply defined whitish areas of varying size occurred in the cervical canal. Reproductions of the specimen and of the microscopic drawings serve to illustrate the findings in this case, particular attention attaching to the penetration of the stratified squamous epithelium into the cervical glands.

EXPERIMENTAL RESULTS

The increasing interest taken in recent years by gynecologists in the physiology of sex hormones, and particularly in the anterior pituitary gland, and the application of the knowledge obtained in this field to clinical problems is illustrated by the abundance of articles on these subjects. The association of the adenohypophysis with factors governing and controlling ovarian function has been the occasion of active experimental research (Evans, Smith and Engle, Zondek). Moreover, the ovarian hormone has been found undoubtedly to influence the activity of the anterior pituitary; and the rhythm of the menstrual cycle is, thus, in all probability due to an interaction between these two organs (Hofbauer, Engle). More recent evidence tends to show that *hyperplasia of the endometrium* may justifiably be interpreted in terms of an overgrowth of its constituents, both epithelial elements and stroma, initiated by an excess of folliculin due to the overactivity of the growth hormone of the anterior pituitary. In the face of experimental evidence,

the point was stressed by the author that the anterior lobe registers its effect on the uterine mucosa through the agency of the ovary. Small cystic follicular atresia of the ovary, so commonly observed in endome-

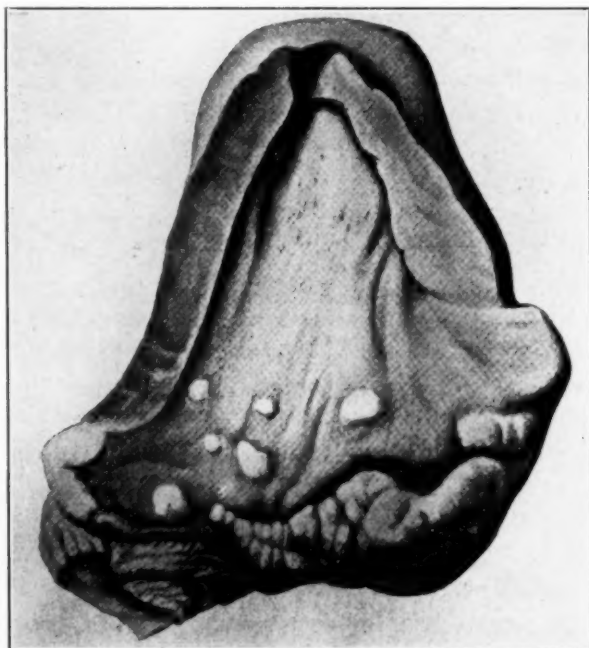


Fig. 1.—Inner aspect of uterus showing leucoplakic areas in the cervical mucosa.

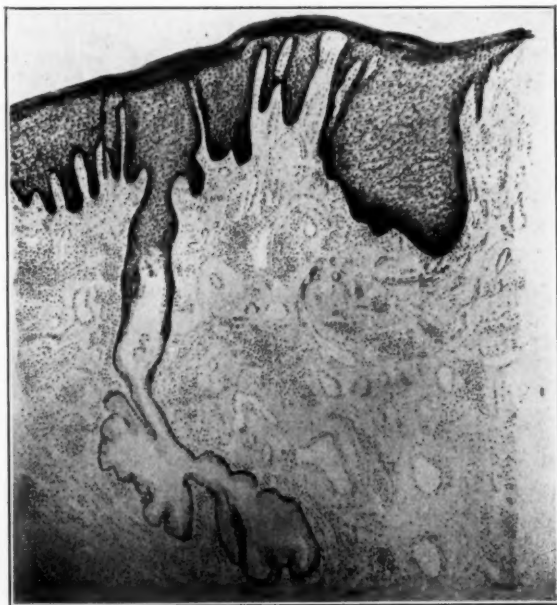


Fig. 2.—Section through a leucoplakic area. Note epidermization. The stratified epithellum penetrates into the cervical glands, pushing up and replacing the columnar epithellum. Note abrupt transition from columnar to stratified epithellum.

trial hyperplasia; striking increase of the connective tissue of the uterine mucosa; and active proliferation of the uterine glands associated with marked cystic dilatation; all these phenomena were observed in guinea pigs which had been treated for two weeks with injections or implantations of anterior pituitary tissue.

In the present study, evidence has been obtained indicating that an overgrowth (hyperplasia) of the squamous epithelium covering the vaginal portion of the uterus can be initiated either by repeated intraperitoneal administration of hypophyseal extracts or by intramuscular transplantations of bits of anterior lobe of the beef. The best results in this direction were obtained in mature guinea pigs by the repeated transplantation of the peripheral parts of the anterior pituitary gland. It is worthy of note that, in the ox, the periphery of the hypophysis shows on cross-section a dark red grayish color which sharply con-



Fig. 3.



Fig. 4.

Fig. 3.—Photomicrograph of section through mature guinea pig's uterus and vagina after administration for two weeks of alkaline extract of anterior pituitary. Note epithelial downgrowths into the edematous connective tissue, and atypical epidermoid cells.

Fig. 4.—Photomicrograph showing strands of deeply stained cuboidal cells penetrating into connective tissue. Note irregularity in size of the cells, and isolated epithelial masses.

trasts with the yellowish central parts. It is the eosinophilic cell of the peripheral part of the ox's anterior hypophysis which harbors the growth-promoting principle. The proliferation of the squamous epithelium on the outer surface of the cervix manifests itself in these experiments by the remarkable development of epithelial prolongations which, in places, extend deeply into the connective tissue. They bear a distinct resemblance to the phenomena occurring in leucoplakia. Such atypical epithelial hyperplasia with encroachment upon the underlying connective tissue spaces also occurs in the periphery of cervical glands, where deeply stained strands of epithelial cells, cuboidal in character

and not infrequently irregular in size and shape associated with the formation of isolated epithelial masses, form projecting finger-like processes. Occasionally, the invading epithelial columns are fronted by a slight small cell infiltration. Epithelial pearls within the downgrowth of the rete malpighii occurred in 3 out of 24 specimens. Figs. 3 and 4 will serve to illustrate these phenomena.



Fig. 5.—Photomicrograph showing metaplasia of cervical epithelium to stratified cuboidal epithelium. Note numerous vacuoles.

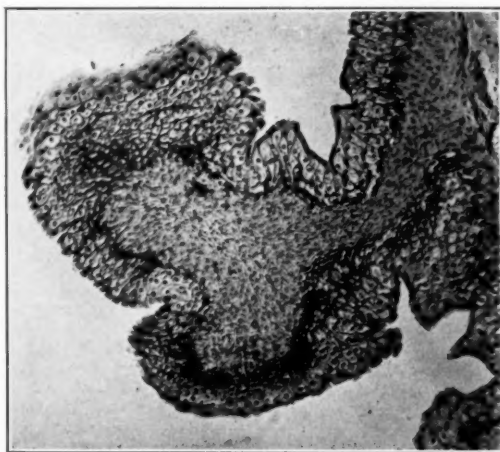


Fig. 6.—Photomicrograph of experimentally produced papillary tumor of parietal peritoneum. Note multi-layered mesothelium. In places, the superficial layer shows ciliated goblet cells.

Attempts to produce cancer-like lesions of the cervix by superimposing local inflammation, as by repeated local applications of from 5 per cent to 20 per cent silver nitrate solution or of tincture of iodine upon the cervical lesions of hormonal-treated guinea pigs, yielded only negative results. It is well to remember, at this juncture, that the occurrence

of spontaneous cancer development in this species of animals is unknown.

The occasional occurrence in our experimental studies of metaplasia of the columnar cervical epithelium constituted an additional interesting feature. Fig. 5 illustrates this point. The columnar epithelium throughout the cervical canal, is replaced by stratified cells of the transitional type.

In considering the stimulating effect which the prepituitary exercises upon the cervical and the uterine epithelium, an observation made in one of our experiments seems to be of particular interest when a papillary tumor of the parietal peritoneum developed. It should be noted that, from an embryologic point of view, the epithelia covering the interior of the uterus and, also, the outer surface of the vaginal portion are derivatives of the coelomic epithelium; in other words, they share with the parietal peritoneum their mesodermal origin. The observation of the occurrence of a papillary tumor, 3 mm. in diameter, on the parietal peritoneum of a rabbit which had received daily intraperitoneal injections of an alkaline extract of anterior lobe for three weeks, all of the injections having been made at the same point of the abdominal wall, serves to strengthen our conception of the growth-promoting effect of the anterior pituitary upon the epithelium of the female generative tract. Microscopically, the formation of stratified epithelial structures, resulting from hyperplasia of the mesothelial covering of the peritoneum associated with the papillomatous proliferation of the connective tissue core, represent the structure of this tumor.*

The results of our investigations, as well as certain observations made by other workers, have given impetus to recent most interesting studies by M. Overholser and Edgar Allen. Their experiments were conducted on *Macacus rhesus*. The animals were first ovariectomized. Later on, the cervixes were traumatized by scissor cuts, this procedure being repeated at from seven- to ten-day intervals. A small metal clip was clamped on the cervix, in addition to the cuts, in some of the animals. Subcutaneous injections of genital growth hormones, pituitary or ovarian hormones, were made mornings and evenings. In all experimental animals, a typical epithelial hyperplasia occurred in the uterine cervix. In many regions, columnar epithelium was surrounded by stratified squamous epithelium. Downgrowth and irregularity of the rete malpighii occurred with formation of isolated epithelial masses. In some cases nuclear changes were seen and a basement membrane was lacking. The slides were submitted to Dr. James Ewing for examination. Through the courtesy of Dr. Edgar Allen, I have the privilege to reproduce here two of his photomicrograms (Figs. 7 and 8).

Fig. 7 represents a section of the cervix from an ovariectomized animal that received only hormone injections. No cervical trauma was given. Dr. James Ewing's report reads: "Much papillary gland overgrowth, much epidermization, much infection, many areas of distinctly atypical epidermoid cells. This is a close approximation to established cancer, especially the very atypical cells. I should have to pass the lesion as early but established cancer."

*A preliminary report of these studies has appeared in the Proceedings of the Society for Experimental Biology and Medicine (27: 1011, 1930).

Fig. 8 represents a section of the cervix from an ovariectomized animal that received cervical trauma and hormone injections. The report on this specimen reads: "Shows early but essential features of infiltrating epidermoid carcinoma, but in an ulcerating area. There is much infection which is probably an important factor." Another section shows "gland overgrowth, downgrowth, much epidermization, somewhat atypical, much infection. This is a pronounced precancerous lesion and trauma must be given an important place."



Fig. 7.—Photomicrograph of cervix of hormonally treated monkey. Note epidermization and atypical epidermoid cells. (Courtesy of Dr. E. Allen.)

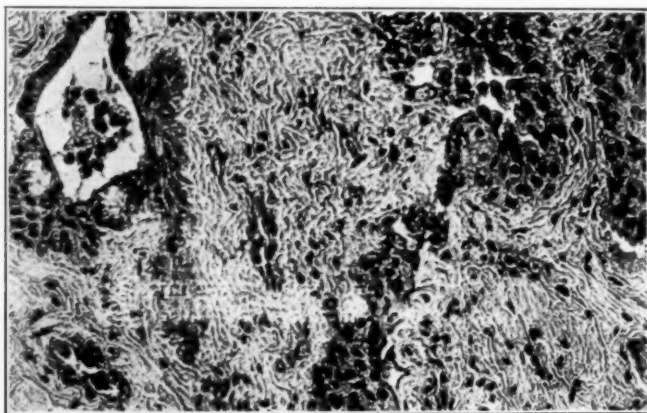


Fig. 8.—Photomicrograph of cervix of monkey which had received cervical trauma and hormonal treatment. Note early infiltrating epidermoid cancer. (Courtesy of Dr. E. Allen.)

The importance of these findings lies in the fact that hormonal principles which are known to be concerned both with the maintenance of the integrity of the female sex organs and their cyclic tissue events, premenstrual growth phenomena, and, hence, are termed "female sex hormones" apparently represent an important causal link in relation to the pathogenesis of precancerous and cancerous lesions of the uterine

cervix. This new conception tends to relegate such lesions to the domain of endocrinologic conditions. In attempting, however, to evaluate the responsibility for the effects produced, individually by ovarian and pituitary hormones, their reciprocal interrelation must be borne in mind. The stimulation of follicular activity by anterior pituitary hormones and, conversely, the increase in the weight of the pituitary following repeated injections of theelol, antuitrin, etc., in experimental animals¹ bear testimony to the close interrelationship of function of the ovary and the anterior pituitary.

CHEMICAL

With the results of the experiments, detailed above, showing the local response of the cervical epithelium to the injections of estrogenic substances, recent investigations proceeding along different avenues converge quite unexpectedly.

Research conducted by organic chemists on the biology and biochemistry of substances which induce estrus in ovariectomized animals is throwing light on their constitution and nature. The general importance of this work is illustrated by the fact that analytical data on the chemical constitution of the sex hormones suggest that they are derived from the sterols by a process which involves a partial loss of hydrogen atoms with the formation of four condensed rings, one being aromatic in character and one containing only five carbon atoms (Butenandt and Browne). In other words, by *dehydrogenation* of common tissue constituents (*sterols*) ovarian hormones are being formed. Their molecular arrangement has many points of resemblance to the structure suggested for ketohydroxyestrin. Incidentally, important researches of Cook, Hewett and Hieger have shown, of late, that in the production of cancerous growth of the skin particular constituents of tar are involved, with a special type of molecular structure, like that of the sterols, but dehydrogenated.² The formation of carcinogenic compounds from sterols, involving a similar process of dehydrogenation to the aromatic state, links these synthetic products with the sex hormones. More particularly, since it has been demonstrated by Cook and Dodds that there are a number of pure organic substances which can induce estrus, as there are a number of pure organic substances which can induce carcinogenesis, and that several of these substances of known carcinogenic activity are capable of inducing estrus.³ In like manner, E. L. Kennaway (London) who has synthesized a number of pure organic compounds capable of inducing cancer when applied to the skin, found that some of these substances with pronounced cancer-producing powers may induce effects in the body like those of estrin. Sir F. G. Hopkins, in commenting on this interesting set of relations remarks: "It is difficult when faced with such relations not to wonder whether the metabolism of sterols, which when normal can produce a substance stimulating physiologic growth may in very special circumstances be so perverted as to produce within living cells a substance stimulating pathologic growth." Considering that in both estrus and carcinogenesis the occurrence of cellular hyperplasia represents a characteristic feature, it is conceivable, in the light of the aforementioned chemical data, that a substance with a certain molecular structure induces a form of physiologic growth in the former, whereas an allied substance may induce cancer, i. e., a pathologic form of growth. Previous tissue changes (hyperplasia, metaplasia) apparently may conduce to such abnormalities of cell metabolism which are apt to set the stage for the initiation of the epithelial drama.

Recent research has provided information concerning the intrusion of an over-activity of the *anterior pituitary* into the *metabolism of sterols* by showing that following the repeated parenteral administration of extracts made from this gland, an increase of cholesterol occurs in the blood of experimental animals (Hofbauer, Teel, Kaufmann).

Moreover, in an effort toward discovering chemicals which in very small amounts cause the continued growth and multiplication of normal and cancer cells, Carl Voegtlin found that *glutathione* has a powerful action on cell multiplication and is present in cancerous tissues. (Bull. of the Am. Soc. for the Control of Cancer; 1934, XVI, No. 2.) The glutathione content of the blood, on the other hand, is controlled by the *hypophysis* as evidenced by recent experiments on dogs which showed that removal of the hypophysis causes a 10 per cent decrease, while treatment with extracts of the anterior hypophysis produces an increase above normal of blood glutathione (Maveroff de Lissner, Compt. rend. Soc. de biol. 114: 726, 1933).

DISCUSSION

Diligent perusal of the literature on hyperplastic uterine lesions discussed in this paper, leaves no doubt as to the inadequacy of our knowledge concerning their pathogenesis. Up to the present, attempts to analyze the underlying etiologic factors almost universally resolve themselves into a contemplation of chronic irritative states. If "chronic irritation" is viewed as a synonym of "chronic inflammation" our lack of knowledge at once becomes apparent if it is recalled that in a certain proportion of cases of uterine "leucoplakia" and "epidermization," objective evidences of inflammatory processes, recent or long standing, are entirely lacking. In addition, round cell infiltration may merely represent a defensive mechanism. On the other hand, the reaction of epithelial structures to irritation and the possibility of their final development into a malignant growth is well recognized. Hyperplasia of the pre-existing epithelium is demonstrable in the incipency of carcinoma. Our ignorance of the causes of cell alteration, however, is being admitted by all earnest workers in this field, while at the present, the tendency prevails to regard epithelial hyperplasias, papillomas, and even adenomas as varying manifestations of one lesion. In the realm of the conditions under discussion, a new guiding principle has developed from the demonstration by Allen that the ovarian follicular hormone exercises a powerful stimulation upon epithelial growth in the female generative tract, and from our observations of epithelial growth in the uterine cervix as a response to an anterior-pituitary growth-factor. Since it is the epithelium of the female generative tract, exclusively, which reacts to such hormonal "irritation," emphasis must be placed on this unique position of the uterine structures. With these data may be brought into consonance the recognition by pathologists of the fact that few tissues of the body present such remarkable and varied reactions to abnormal conditions as do the epithelial elements of the uterine cervix.

The histogenesis of both, squamous metaplasia affecting the cervical epithelium and extending deeply into the glandular ducts, and atypical

proliferation of the epithelium covering the vaginal portion could be traced, experimentally, to an overresponse of these structures to a functional stimulus of the anterior pituitary. The processes excited must be regarded as essentially identical with the lesions designated as leucoplakia of the uterine cervix. Their clinical significance, as to what degree they precede and favor the development of cancer, still remains to be accurately defined. In biopsies obtained from suspicious areas of diseased cervices, such epithelial hyperplasias may sometimes be difficult to differentiate from true cancer. As an illustration, in Fig. 9 showing a biopsy taken from a patient approaching the menopause, profuse cellular proliferation was visible. Applying, however, the criteria of malignancy, i.e., invasive growth, change in cellular morphology and hyperchromatism, the evidence in this instance is in favor of a benign process.



Fig. 9.—Photomicrograph of biopsy from uterine cervix; suspicious lesion removed from anterior uterine lip of patient approaching menopause. While the upper part of the picture shows normal cervical epithelium, in the lower part stratified epithelium is visible, without mitoses and without invasion (hyperplasia). Note abrupt epithelial transitions.

The work of continental biochemists, quoted above, supplies considerable evidence to associate carcinogenic hydrocarbons with female sex hormones, as regards both their common derivation from sterols and, incidentally, their estrogenic properties. In view, however, of our defective knowledge of the function of sterols in epithelial cells, it would be idle to indulge in hypothetical explanations of the nature of the metabolic changes in deranged cellular structures which may conduce to tumor formation.

The isolation of the exact ingredients of tar which produce cancer marks a significant advance of knowledge in the problem of carcinogenesis. Their correlation with female sex hormones appears of particular interest in view of the clinical fact that the incidence of cervical cancer, although the age of appearance of the disease is subject to wide

variations, prevails in women approaching the menopause and following this event. A further interesting point has also been established by massed statistics, that the subjects of cervical cancer have shown a fairly high degree of fertility. While parturient lacerations and the chronic inflammatory conditions which frequently follow them have been almost generally regarded as the immediate instigators of the disease, a different opinion, based on the study of incipient cancer has, of late, been expressed by prominent gynecologic pathologists to the effect that in the search for the actual cause of cervical cancer, it will be necessary to establish the rôle played by other hitherto unknown factors. As a possibility relevant to the problem under consideration, the occurrence, during gestation, of epithelial hyperplasia of the cervical epithelium has recently been suggested by the author as supplying a missing link in the chain of evidences connecting pregnancy with later development of carcinoma.*

Pregnancy is associated, in the human being, with hyperplastic and hypertrophic changes in the anterior lobe of the hypophysis as a response to chorionic stimuli. Diffuse hyperplasia of the anterior lobe arising from functional overgrowth may occur in advanced form, after multiple pregnancy. That the radical changes occurring in association with the menopause induce certain structural alterations of the adenohypophysis is attested by many facts. Current opinion tends to link this increase in number and size of the eosinophiles in the anterior pituitary with the loss of growth restraints (i.e., ovarian function). When these facts are examined in the light of the above considerations, the acquired *constitutional predisposition* of the multiparous woman to the development of cervical cancer during the early menopausal period may be defined as the *result of a disturbance of balance between hypophyseal and ovarian activity, associated with altered conditions of their final receptor*; the latter factor embracing both, *diseased cervical tissue* which has been rendered vulnerable to cancer production by previous epithelial events, and *reduction* at this period, *of the natural resistance* of the fibrous cervical tissue. In other words, it is the *concurrence of a systemic (constitutional) factor* intimately associated with the mechanism of cellular growth and metabolism, *and of a local factor* bound up with previous tissue changes, which apparently plays a predominant part in determining the liability of the uterine cervix to develop malignancy. This new conception calls, at present, for reserve of judgment. It is worthy of note, however, that the occurrence of remarkable *hyperplastic changes of the eosinophiles* in the anterior hypophysis has been established in a considerable number of cases of uterine cancer by the researches of Karlefors, Berblinger, Susman, Kiyono; and in this country of late, by the extensive studies of G. A. Wyeth. It should be noted that clinical observation in connection with experimental findings have led to the result that the eosino-

*See: This Journal, 1933, June.

philes of the prepituitary furnish the growth hormone. Moreover, Zondek and others recorded the abundant excretion of prolactin in the urine in 83 per cent of cases of cervical cancer, whereas in cases of extra-genital malignant tumors this phenomenon did not occur (Saphir). Viewed in this way, cervical carcinoma as a disease entity seems to differ from histologically similar malignancies in other organs, in such attributes as its particular etiologic aspects, certain endocrine and local structural disturbances being involved.

Clinically, the point stressed in my previous paper that as an important element in cancer prophylaxis, proper care of the endocervix in the postnatal clinic requires emphasis on careful inspection and immediate attention to any abnormality in its substance, must be enlarged by urging the detection of any departure from the normal of the mucosa lining the cervical canal, by routine speculum examination in subsequent years, of women who have previously borne children or have, for a considerable period of time, been affected with cervical discharge; since these conditions conduce to hyperplasia and metaplasia of the epithelial elements of the uterine cervix. *Restoration of anatomically normal cervical epithelium* (which implies normal cell metabolism) represents the most valuable weapon for attack in the problem of *prevention of cancer of the uterine cervix*.

In conclusion, reference to recent researches concerning demonstrable effects of the pituitary on the growth of tumors seems cognate to our subject. Bischoff, Maxwell and Ullmann found that the growth factor associated with the anterior pituitary contributes to the regulation of the rate of growth of transplanted tumors in rats. In an attempt to stop pituitary activity, irradiating the head of the animal with roentgen rays or implanting radon seeds into the pituitary region was followed by a significant retardation of the rate of tumor growth.⁴ This observation lends interest to the recent reports of Voltz covering the results obtained, during the past ten years, in the treatment of cervical cancer in the Clinic in Munich. In addition to the local treatment of these patients with radium, the technic employed included in each case a preliminary irradiation of the hypophysis, as recommended by Hofbauer (in 1923). The improvement in the general condition of the patients and the increase in the percentage of cures obtained with this treatment, are emphasized in these reports to the League of Nations Committee.⁵ Druchrey and Hochwald extirpated the hypophysis in a large number of rats and implanted the animals with the Jensen sarcoma, both before and after the operation. The growth of the tumor was strikingly retarded. This phenomenon of retarded growth did not occur if the slightest trace of pituitary tissue was left behind. On the other hand, injections of the pituitary growth hormone into these animals increased the rate of growth of the tumor.⁶ These results have, of late, been corroborated by the work of McEuen,⁷ and of DeFermo.⁸ F. W. Hartman⁹ reports his recent observations pointing to the relation

of tumors to the anterior-pituitary. Extracts of the gland increased the number of takes in transplanted carcinoma as well as the rate growth of these transplanted tumors in the rat. "These occurrences make the conception of endocrine abnormalities and imbalance as predisposing to malignancy a tangible thing."

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PELVIC EDEMA, DIAPEDESIS, AND RHEXIS*

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RECENT research and a better understanding of general biologic function have shed a new light upon pelvic function both normal and vitiated. In many instances, edema, diapedesis, and rhexis are separate clinical entities, which never pass from the one to the other. In other words there are no transition stages. In others, equally, perhaps more numerous instances, the differences are merely degrees of intensity of a single causative agent, the variety of manifestations in a single patient being due to circumstances of local or topical influences. It is well to recognize this at the outset. It explains many inexplicable phenomena, and many heretofore unrecognized allied states.

There are two or three principles of profound interest which must be noted:

1. It is rare that there is but a single causative agent in any given case of uterine or pelvic hemorrhage. Two or more agents may operate consecutively, or may alternate as cause and effect, introducing a vicious circle of production.

*Read at a meeting of the Brooklyn Gynecological Society, March 3, 1933.

2. The reason the pelvis and particularly the uterus is so frequently chosen as the site for an extravasation when the immediate causative agent is a general one, is due to the uterine habit of menstruation, which makes it more susceptible than any other organ to an exaggeration of any abnormal hemorrhagic dyscrasia.

3. It is now recognized that in most cases of local pelvic disease producing extravasations, there is a general causative agent operating through the circulatory systems, which determines the extravasations both quantitatively and qualitatively. These general agents operate either (a) through changes in the blood cells or in the chemical composition of the plasma; or (b) through changes in the intima of the arterioles, capillaries, and lymph channels causing these fine linings to lose to a certain degree, and temporarily, their vital function of discrimination, as to what shall pass through from the blood stream or what shall be absorbed into the lymphatic system; and (c) a combination of both blood and intimal dyscrasias.

Virchow's famous dictum, that "some hemorrhages find their cause in the blood, others in the blood vessels" has now a wider scope, and might read that "some extravasations find their cause in the blood, others in the intima of blood vessels or lymphatics." It must be clearly understood that there are three distinct, closed circulations, the blood stream, the tissue plasma circulation, and the lymphatic system; and an edema may be due not only to an exaggerated extravasation from the blood capillaries, but also to vitiated tissue retention of plasma or equally to retarded lymphatic absorption of a normal vascular or cellular activity. As examples of a vascular dyscrasia we may mention purpura of an infectious nature; of the exaggerated plasma cellular retention type one needs but to mention the consequences of an upset in the basic alkalies and acids of the body, or an upset in the water-retention endocrine; in lymphatic absorption one has only to recall the condition in a true phlegmasia alba dolens of the puerperium. There are, of course, many cases in which the etiologic factors are still shrouded in mystery, but we may offer a classification much more comprehensive than heretofore permissible, although still a very imperfect one.

THE CAUSES OF EDEMA, DIAPEDESIS AND RHEXIS

A. Mechanical:

- | | |
|--------------------------|------------------------------|
| 1. Abortion | 6. Fibroids and polyps |
| 2. Postpartum hemorrhage | 7. Torsion of ovarian tumors |
| 3. Placenta previa | 8. Cardiorenal disease |
| 4. Ectopic gestation | 9. Prolapse |
| 5. Fibrosis uteri | |

B. Destructive:

- | | |
|---------------|-----------------|
| 1. Malignancy | 2. Tuberculosis |
|---------------|-----------------|

C. Toxic:

- | | |
|--------------------------------------|--------------------------|
| 1. Chemical | 4. Hormonal |
| 2. Metabolic | 5. Avitaminosis |
| 3. Infections (a) general, (b) local | 6. Toxemias of pregnancy |

D. Blood diseases

E. Familial hereditary blood dyscrasias

A glance at this classification will show its imperfections. The chief reason lies in that at least two causes operate simultaneously or consecutively in each case. It is often difficult, even impossible, to determine primary and secondary causes in any given patient, and there is often an interchangeability in the order of their operation, so that the classification simply reduces itself to an enumeration of possible causes in which any two clinically similar cases may change the order of sequence of agents. Let me endeavor to make this clear. Given a case of fibroid of the uterus, uterine hemorrhage may be initiated by the mechanical influence of the fibroid, or by a blood dyscrasia or by an upset of sequence in ovarian hormonal function, or by any combination of these. And so it is with any case of uterine hemorrhage, and in their ultimate disposal our mutilating operations and destructive cauterizations are merely confessions of our failure.

In 1914 Osler forcibly called our attention to the fact that blood diseases may take on many types of extravasations hitherto unrecognized as closely allied and, that in many instances, the differences in manifestation are due to local causes. We are coming back to the fact enunciated above, that the uterine habit of menstruation is a strong predisposing factor in choosing the uterus, and not some other organ, for hemorrhagic manifestations. Osler stated also that cases have an etiology either infectious or metabolic. In this of course we see an incomplete categoric subdivision, for we have enumerated many other causes which were unknown in his day. He further stated that "local edema, petechiae, purpura and hemorrhages of a septic nature are all manifestations of a *supersensitiveness*. The diverse localizations, the variable character of the exudate now serum alone, now blood or blood and serum together, are points that await explanation. The actual exudate is conditioned by the epithelial cells of the capillary wall, damaged by the circulating poison, as is so well shown in snake venom. Before long an anaphylactic key will unlock the mystery of these cases." The following observation bears out the idea that the primary action of the noxious agent is on the epithelial wall. In a case of purpura fulminans seen by Brock the skin was plum-colored on the third day. Having abdominal distress at the outset the man had put a large mustard poultice below the navel, which had reddened, but not blistered, the skin. Everywhere else but into the skin below this region hemorrhage had occurred. The same blood had circulated, but the stimulating influence of the mustard had effected a change in the lining cells of the capillaries of that area, enabling them to resist an injury to which all others had succumbed. When we add to this that local edema, so-called angioneurotic edema, petechiae, purpura, and hemorrhages from the mucosae or into the internal organs may be but merely local differences of a common cause acting generally throughout the body, we have added another chapter

to our knowledge of this complex subject. It would seem from close scrutiny of cases that the changes in the intima of the blood vessel and other local manifestations are brought about through the intermediary of the autonomic nervous system. In a few cases the action of the general agent seems a direct one.

If we discussed each of the larger groups in the foregoing classification, we would find that they have much in common and that it would lead to needless repetition. So that in the mechanical group only one or more of the component elements need be dealt with in detail.

ABORTIONS

In abortions, for example, it is found that the primary obvious cause may be a supersensitive uterus, a diseased endometrium, a diseased ovum, or an hormonal dysfunction. But upon closer scrutiny we may find that the supersensitiveness of the uterine musculature may be due to an inherited weakness or an acquired endocrine dyscrasia acting through the parasympathetic system, or it may be the result of inflammatory disease of the pelvis or adjacent organs; similarly the diseased endometrium may be secondary to an advanced chronic endocervicitis, or to an ovarian hormonal dysfunction. These are enumerated merely to show how remote may be the primary cause. Hemorrhage begins usually with a breach of continuity between ovum and endometrium, secondary to uterine expulsive effort. But the quantity of blood loss will depend a great deal upon blood dyscrasias at that time. In many instances this blood dyscrasia, due to toxemia, either infectious or metabolic, may be the primary cause of the abortion, causing retroplacental detachment and death of the fetus. In such instances the hemorrhagic state during the abortion stage is often alarming, and sometimes fatal. Such blood dyscrasias have not received the attention that is due them. When recognized they are often amenable to treatment. In many instances in the author's experience they have been due to chronic focal infections of teeth, tonsils, gall-bladder, etc. In other instances the cause is found in an acute ptomaine poisoning, or in one of the acute fevers. But endocrine dysfunction is behind a great many of these blood dyscrasias, chiefly among which may be corpus luteum dystrophy, parathyroid, or thyroid, or pancreatic dysfunction creating an imbalance in the blood or lining intima of capillaries and inducing extravasations which disturb normal relations of continuity.

The more we study the blood of women in general, and of the pregnant in particular, the more we realize that the blood is a labile fluid, which primarily must bear the brunt of any invasion, and must act as an intermediary for the protection of the tissues. The blood's

lability is seen in operations, where even the quantity of anesthetic often determines the difference between normal and excessive bleeding propensities.

One or two instances will make this matter more impressive.

The author was present when one of his patients was being transfused before surgical intervention. She was not an hemorrhagic case. During the transfusion she developed an urticaria. The process was arrested by a small dose of adrenalin. Her menstruation which had ceased one day previously was renewed by the change in the blood chemistry, incident to the transfusion. Here then is an instance of a plasma extravasation over the body (urticaria), but of a blood extravasation from the uterus, and the difference is explained only by the uterine habit and the recentness of the menstrual cessation.

Another case came under observation recently. This patient presented multiple fibroids, discovered six months previously. The menstrual discharge was excessive, and there was a mild fever. Sedimentation normal. At operation it was found that she was still suffering from a general hemorrhagic toxic state. She bled and oozed at every cut or puncture. There was some blood-stained fluid in the pelvis, and a panhysterectomy was done. On section each corpus and each follicle had a certain amount of moderately recent hemorrhage about it. Each fibroid had become filled with blood. Here again was an hemorrhagic agent acting generally through the circulation without clinically appreciable effect except in the pelvic organs, where, owing to the premenstrual congestive state and the presence of the hormone which determines the onset of menstrual flow, the pelvic organs became widely involved in the expression of the hemorrhagic state. Upon close questioning afterwards, it was elicited that she had developed a nosebleed twenty-four hours before the onset of the pelvic distress. The epistaxis was incited by a forceful sneeze.

In another case an intramural fibroid of the uterus was comparable in size with a four months' pregnancy. A slight increase in the menstrual flow occurred during the past year, but no other sign of departure from the normal. She was suddenly seized with severe abdominal pain accompanied by rigidity and tenderness and slight temperature. Uterine hemorrhage set in three days prematurely and became blackish and very copious, so that the patient had to be transfused before operative interference. She oozed a great deal at operation, and after a supravaginal hysterectomy, the uterine mucosa was found quite hemorrhagic, and a large fibroid, which in no way seemed to impinge upon the mucosa, was intensely hemorrhagic, under great tension, and discolored by extravasations.

Such cases might be greatly multiplied but sufficient has been stated to make clear that in fibroid, as in other states, the blood and intimal changes brought about by an agent in the general circulation, accentuated by the habit of menstruation, determine the uterus and pelvic organs, owing to their constant state of unrest in ebb and flow of the procreative function, as the chief seat of hemorrhagic manifestations. This explains why, in the mild progressive functional disturbances, uterine hemorrhage develops so frequently not as a metrorrhagia, but rather as an accentuation of menstruation, a menorrhagia.

What has been written of fibroids applies equally to fibrosis uteri, polyps, placenta previa, and postpartum hemorrhage. In cases of fibrosis uteri or more properly, chronic subinvolution, we find a con-

dition somewhat analogous to fibroids of the uterus. In 1912 the author attributed the uterine hemorrhage so commonly found associated with this disease, to the fibrosis of the uterine wall, and more especially to the functional sclerosis of the intramural blood vessels. This we recognize today as only a part of the truth, and only the minor part. Chronic subinvolution invariably dates its origin back to a full-term pregnancy or abortion, and the arrest of involution and crystallization of the redundant tissues are due to a general or local cause or causes. But the hemorrhages of the chronic subinvolution, first menorrhagic, later metrorrhagic, rarely set in until about forty years of age. The chronic subinvolution frequently antedates this age by ten or more years without evidence of any disturbance of the pelvic procreative function. If trouble sets in to disturb function in a uterus that has been affected for many years, then undoubtedly the dysfunction must be due to the operation of a newly introduced agent. And now we realize that this new agent is a general toxic state acting generally throughout the body but more forcibly upon a diseased uterus, which then becomes an incidental secondary factor to the primary blood dyscrasia. That the primary dyscrasia operates primarily through the blood stream whether it be toxic, metabolic, or endocrine, and secondarily through the autonomic nervous system upon blood vessels and tissues, upsetting their normal function. That in the majority of instances the general cause is an endocrine dysfunction is supported by the common incidence of the uterine hemorrhages at or near the menopause, when women are extremely susceptible to endocrine imbalances. Removal of such uteri does not cure the primary cause but merely removes the most susceptible organ of the body and uterine susceptibility cannot be wholly attributed to the diseased uterine vessels and fibrotic walls, which undoubtedly are a relative block to normal contractibility and retractibility, but a great deal of the pelvic election must be laid to the periodic uterine menstrual habit. That this is so cannot be doubted, because the uncontrollable uterine hemorrhages near the menopause are almost as numerous in cases without clinically appreciable chronic subinvolution, and conversely a very large percentage of cases of marked chronic subinvolution never show signs of metrorrhagia, but pass without misadventure into an uncomplicated menopause.

In conclusion, one may ask, what is behind the endocrine dysfunction to initiate the imbalance in the affected glands? Primarily, advancing age, with its wear and tear, and the advent of the end of sexual life, all of which may be expressed in the diminution of the gland reserve and in their greater susceptibility to instability, and secondarily to vitiated metabolism, toxemia, emotion, and vascular instability.

The group of *destructive* lesions need not detain us. We now come to the *toxic* group. These are by far the most interesting and the least understood of all the extravasation diseases.

It will be well to restrict the description to two or three of this group, because most of the remarks apply equally to the others. It is now well recognized that the reason all of these are grouped under one heading, "toxic," is because they are put into operation by a generalized agent which by disturbing normal functions and, by introducing abnormal metabolic products, becomes the dominant disturbing factor.

This metabolic disturbance may be brought about by abnormal preparation and assimilation of ingested food, or by the toxic agents of microbic metabolism and destruction, or by a dyscrasia in an endocrine gland causing metabolic distress in the function over which that gland normally exercises control. The same applies to deficiency diseases due to avitaminosis.

It is hardly necessary to do other than mention the effect of food idiosyncrasies in developing macular extravasation. These are too frequent clinically to demand other than a passing notice.

But when we come to infections we are face to face with an interesting problem. Acute diseases rarely develop grave extravasational phenomena. The acute exanthemas are illustrative of the minor, widespread disorder which is seldom of interest other than diagnostic. But on the other hand, it is the subacute, and low grade, protracted infections which are so prone to develop hemorrhagic disease characterized by petechiae, edemas, and hemorrhages. Owing to the constancy of the rule the author has classified these as "cumulative" infections. The hemorrhagic diathesis usually develops suddenly and quite unexpectedly in a patient not obviously very ill, and though the uterus may be the organ manifesting the major sign of hemorrhage, the cutaneous surfaces are usually not immune from extravasation phenomena chiefly as petechiae or purpuric patches. Other less discrete extravasations usually occur on pleura, pericardium, and other serous surfaces.

The same remarks apply to toxemia stages of the first and third stages of pregnancy. We find the extravasational diseases particularly in the low grade cumulative toxemias, and the onset is rarely of the fulminating type described in textbooks, but chiefly of the insidious character, manifesting its past "concealed" presence by the development of an "apparent" uterine bleeding. Concomitant cutaneous lesions are also not uncommon, but are frequently overlooked. An hormonal dyscrasia, whether of the excessive or deficiency variety, operates by a disturbance in the metabolism over which it normally exercises a control, or by disturbing the normal sequence in endocrine

or metabolic functions. It is being recognized more fully every day that every endocrine has a *raison d'être* and, that is usually to control some corporeal function so that it cooperates in the general welfare in the body corporate. To many of the most important functions there are an inhibiting and a stimulating endocrine, and any disturbance in the balance of these spells a metabolic dysfunction, and if this should continue for a period, it will lead eventually to first occult then recognizable organic disease. These endocrine derangements, and to particularize, thyroid deficiencies, parathyroid, and anterior and posterior pituitary dyscrasias, frequently lead to pelvic extravasations which cannot be controlled except by mutilating surgery or cautery unless the primary cause is detected. But of vastly greater interest are the causes of pelvic vascular extravasations which arise out of lack of sequence in the ovarian function of ovulation and lutein development. The normal functioning of these two processes in proper sequence is essential for the healthy menstrual phase. The disturbance of the hormonal sequence may be primarily ovarian, as for instance, where the sclerosis of the ovary inhibits the normal chronologic rupture of the graafian follicle, or the primary agent may be the pituitary which by withdrawal of its stimulation may upset the normal sequence in the first stage of procreation. It is just because so many factors may underlie the appearance of abnormal uterine hemorrhage that it behooves us to examine into these cases with all the intensity of scientific research in the hope of uncovering the primary cause or causes. Our endeavors will be richly rewarded, but owing to the imperfect state of our knowledge of this difficult subject, and owing to the labile state of both blood and blood vessels in super-sensitive individuals and the great instability of endocrine secretions in hypersensitive women, there will still remain a large percentage of cases that will resist every therapeutic attack, and will leave us no alternative, but to acknowledge our defeat by the employment of operative ablation or of caustic destruction of function by x-ray or radium.

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DISCUSSION

DR. CHARLES A. GORDON.—My experience with antuitrin-S has been quite a large one. My results are not as discouraging as Dr. Goodall's. I have had a great many results that I thought were due to antuitrin-S. I have seen a girl of eighteen who had been curetted nine times, relieved by this preparation. Possibly these patients of mine did well with antuitrin-S, because, as Dr. Goodall says, they were due to get well.

DR. SAMUEL A. WOLFE.—Previously the terms "fibrosis uteri" and "subinvolution" were used synonymously. Uteri removed for this condition have routinely shown internal adenomyosis, with or without endometrial hyperplasia. In addition, a goodly number of uteri presented concomitant hyperplasia of the myometrium.

Whether the hyperplasia in the mucosa and the muscle of the uterus was the result of one basic factor in either the ovary or the pituitary, or whether the muscle hyperplasia is the response to invasion of the mucosa, cannot be determined. The clinical condition of fibrosis uteri, which is so commonly encountered at the menopause, is related to puberty hyperplasia and bleeding. The pathologic study of subinvolution was made upon uteri removed during labor and the early and late puerperium. We have found the changes in the vessels described by Dr. Goodall. Whether the vascular changes in themselves are sufficient to account for the tardy reduction in size of the puerperal uterus requires further confirmation.

In reference to the criticism of opening the abdomen in cases of complete procidentia, I beg to state that this procedure is reserved for those cases of such complete prolapse with ulceration, that it was impossible to keep the uterus and vagina in the pelvis by any means or by any posture, and to operate upon these patients by the vaginal route, in the presence of ulcers, is a risk not to be undertaken. We have had five such cases in the last two years. One with a complete procidentia and an ulceration the size of a fifty-cent piece, was treated unsuccessfully in the hospital for over six weeks. Finally the ulcer was excised and sutured. The result was an even larger ulcer. Ultimately a Lefort operation was done with a complete breaking down of the sutures. Since then I have adopted the policy outlined in my paper, in which cases of ulcers of the cervix and vagina heal in a short period, as do varicose ulcers by compression and restoration of normal vascularity and nutrition. In one of these cases the ulcerations were extensive. The extrapelvic mass was the size of a coconut. The rectum had prolapsed about four inches and the sphincter ani had a diameter of two and a half inches. The organs could not be kept in the pelvic cavity by any means. The abdomen was opened, the uterus pulled up, the rectum was also pulled up and stitched with two rows of silk to the posterior vaginal and uterine wall, and the uterus then fixed to the abdominal wall by six silk sutures. Recovery was uninterrupted. Bowel function was quickly restored. In ten days the vaginal ulcers, edema, and induration had disappeared. The cystocele had disappeared, and an easy extensive perineorrhaphy was done on the twelfth day, with primary healing and complete restoration of normal relations and function, and a shortened hospitalization of many weeks.

The theory of fetal deformities in connection with hydramnion is, after all, but an hypothesis. Every bit of knowledge we possess was preceded by an hypothesis to meet the facts. This one does meet the facts and will serve until we find a better one.

That intraamniotic infection does frequently occur is seen in the frequency with which we meet amniotic infections in cases of spontaneous abortions. In the past year I have noted amniotic infections, with fever and great prostration during labor, without being able to account for the condition until the membranes were ruptured, allowing the foul smelling amniotic fluid to escape. Such severe infections in early fetal life would undoubtedly lead to early fetal death, but not all are of that severe type. Most infections are greatly attenuated, and a compromise is established between the host and the uninvited guest. Such attenuated infections are met with constantly in the cervix uteri and such organisms, having gained access to a serous cavity like the amniotic, set up, as in other serous cavities, not a hyperplasia but a hyperfunction expressed in overproduction of secretion in response to irritation.

Dr. Gibson stated that I said that the cases of idiopathic uterine hemorrhage would eventually cure themselves. I believe that to be a rare outcome in such cases in young girls. Uterine hemorrhage in such cases is merely an expression of a general endocrine instability which may manifest itself in one train of symptoms or another, depending upon which gland is temporarily upset in its function. As a

consequence, we frequently find metrorrhagia alternating with long periods of amenorrhea, showing thereby again the great glandular instability. Of course, there are all degrees of dysfunction, and the milder departures from the normal frequently rectify themselves with improvement in general health, perhaps never to recur, or to recur only on lowering of general resistance and compensatory glandular co-operation.

In certain cases, after all medication has failed, one is driven to the use of deep x-ray or radium. In the women approaching the menopause the cases offer an easy solution. In the young girl, on the other hand, it becomes a very weighty problem. There is always the danger of producing a permanent amenorrhea, and small doses may give only temporary relief with a recurrence that is often worse than the initial symptom. I would not give the impression for one moment that there are not many of these patients who are not cured. Some respond to anterior pituitary preparations, since anterior pituitary exercises a control over many other secretory organs of the body, but oftentimes the condition is merely temporary. In many of these cases I feel tolerably certain I am correct in stating that we are dealing, not with a dysfunction of one gland only, but with a combination or a group of glands, and should be borne in mind that the glands about which we have a certain knowledge are very few compared to the glands concerning which we know almost nothing. Until our knowledge of endocrinology is much more perfect, it behooves us to keep a very open mind.

AN ANATOMICAL AND CLINICAL STUDY OF A THORACOPAGUS MONSTER DELIVERED ALIVE AT FULL TERM

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OUR interest in human monstrosities was stimulated by an unusual case of thoracopagus which was delivered alive at full term by one of us (B. B. B.). Human fetal monsters are rare but occur with sufficient frequency to warrant a short classification and discussion of the more common forms. The literature contains numerous classifications similar to those found in the works of Fisher¹ and of Ahlfeld.² Interesting details of structure and relationship are to be found in the commentaries of Blane³ and of Guinard.⁴ Probably the classifications of Geoffroy-Saint-Hilaire⁵ and Förster,⁶ modified by Hirst and Piersol,⁷ are the most convenient for practical purposes.

The above classification is based solely on an anatomical distribution of the duplicate parts and does not take into account any etiologic factors. Indeed, so little positive information on this phase of the subject is available, that it was thought best to omit any theoretical discussion. Moreover, since this study deals with one particular type of monstrosity and because of lack of space, no reference is made to the

TABLE I. COMPOSITE MONSTERS—DOUBLE AUTOSITIC MONSTERS

A. Terata	Katadidyma (duplicate from below upward)
	a. Diprosopus (two faces)
	b. Dicephalus (two heads)
	c. Ischiopagus (joined at coccyges and sacra)
	d. Pygopagus (united back to back)
B. Terata	Anadidyma (two bodies attached to one head)
	a. Dipygus (double pelvis, double genitalia, four legs)
	b. Syncephalus (one head with two faces)
	c. Craniopagus (fusion of the two skulls)
C. Terata	Anakatatididyma (duplicate above and below)
	a. Prosopothoracopagus (joined by faces, necks and chest)
	b. Omphalopagus (united in region of thorax and abdomen)
	c. Rachipagus (common vertebral column)

numerous asymmetrical parasitic forms of both single and double monsters which differ radically in appearance and anatomical relationship from compound autositic monsters. That double autositic monsters are composed of symmetrical fetuses is demonstrated in the following case report.

CASE REPORT*

I. H., a colored multipara, aged thirty-six years, about 65 inches tall, weight 110 pounds. When first seen the patient was thirty-six weeks pregnant and in good physical condition. Her past history was negative for illnesses of any consequence. Prior to her present pregnancy, she had had ten children, all single spontaneous births, and normal in every respect. Eight of the children are living and in good health. One child is said to have died at three weeks of age of infantile paralysis and one at fourteen months of spinal meningitis. There was no history of twins, monstrosities or any abnormal births on either the maternal or the paternal side of the family. The patient expected to be delivered by a licensed midwife but came to my office about a month prior to delivery to engage my services should the case prove to be abnormal.

Physical examination at this time (one month before delivery) showed the patient to be in excellent physical condition with only a slight elevation of blood pressure (130/78 mm. Hg), and normal urine. The blood Wassermann was negative. Her uterus was very large, protruding almost at a right angle from the body due to wide separation of the abdominal muscles. Her abdominal wall being very thin and uterus easily palpable, it was not difficult to outline twins. A fetal heart was heard in the lower quadrant of each side and relatively in the same position.

The patient's last menstrual period was about the middle of March, 1932, making her estimated date of confinement about the twenty-third of December. Labor, however, began on December 10. With all previous confinements labor had lasted from two to four hours, each labor being spontaneous and without assistance. In the present confinement she was in labor twenty-four hours under the care of a midwife before my assistance was requested.

Examination in the patient's home at this time (Dec. 11, 1932) showed the cervix fully dilated but the membranes had not ruptured; one head was fixed at the pelvic brim, but no descent had occurred. Only one fetal heart could be heard and it was to the right of the midline. The diagnosis of the presentation and position of the presenting child was right occipito-anterior.

*Contributed by Dr. B. Bruce Brumbaugh, who delivered the patient in her home.

Shortly after my arrival, the membranes ruptured spontaneously and the uterine contractions became more severe. From this point on through delivery the patient was given a few drops of chloroform at the onset of each contraction to lessen the severity of the pains. No progress was made for one-half hour. This seemed to be due to the acute angulation of the uterus which protruded through the diastasis between the recti muscles.

With the idea of bringing the uterus more in line with the birth canal, the patient's thighs were flexed on the abdomen and a strap placed over the knees for her to pull on. By means of this procedure and by making pressure with the palms of both hands over the fundus of the uterus, the presenting part became definitely engaged in the superior strait. At the end of an hour about one-half of the head of the first child protruded from the birth canal. At this stage the head did not slide over the perineum as in a normal delivery but remained stationary. Since the patient had a relaxed outlet it was easy to grasp the head of the first child. After delivery of this head by considerable traction, external rotation did not take place, but the occiput remained anterior. At this point it was almost impossible to make further progress toward delivery. Pelvic examination showed the left arm of the first baby lying just inside the vagina.

Immediately following delivery of this arm, the head of the second child could be seen posteriorly. Pressure was made on the second baby's head, pushing it upward within the birth canal in an attempt to free the first twin from the second, but the former seemed to follow the latter back into the vagina. At this stage the operator thought that possibly the twins might be conjoined. Nothing could be accomplished by traction on the head of the first baby. Its right arm was apparently extended along the side of the body and after some difficulty was delivered.

Having delivered the head and both arms of the first child, another attempt was made to effect complete delivery of this baby and, at the same time, to spare the perineum as much as possible. Accordingly, the head of the second twin was pushed upward by the operator's left hand while traction was made with the right hand around the neck and under the chin of the first twin. But this attempt was also unsuccessful because the opposing forces counterbalanced. The failure of this procedure made the diagnosis of conjoined twins more probable. If such were the case, a destructive operation would be indicated. However, since the patient was a multipara with a markedly relaxed vaginal outlet, the operator felt justified in attempting to deliver the monster alive.

By means of intermittent traction on the head of the first baby together with pressure over the fundus of the uterus, delivery progressed fairly rapidly as the perineal floor gave way. The head of the second infant was flexed anterolaterally and lay on the chest of the first infant, its occiput presenting under the chin of the latter. The first baby attempted to breathe before complete delivery was accomplished. There was a deep second degree laceration of the perineum. The whole procedure took about two hours, and both babies were born alive.

The babies were joined from the sternum to the umbilicus and faced each other in almost perfect apposition. Their respirations were very shallow, each child breathing independently of the other. Heart sounds were heard in the chest of each baby. Their rates were identical but never more rapid than twenty beats to the minute. At the end of three-quarters of an hour respirations ceased.

There was one cord and one placenta. The single umbilical cord entered the joined bodies through a defect in the fused abdominal walls located at the lowest portion of the common union. This defect was about the size of a silver dollar and was covered by a thin fascial membrane through which a portion of the small intestine was visible. The monster weighed eleven and one-half pounds at birth and each twin was of the female sex.

There were only about 750 c.c. of amniotic fluid and very little postpartum bleeding occurred. Following extrusion of the placenta, the perineum was carefully repaired. The patient ran a temperature of 100° F. on the third and fourth days following delivery, but there were no ill effects. Her lochia was normal throughout and her convalescence uneventful. The patient was seen one month following delivery and found to be in good health. The babies were given to the University of Maryland for further study and observation.

ANATOMICAL STUDY

The specimen was preserved in formalin for three weeks prior to dissection. The general form and contour of the monster are shown in Fig. 1. The relation-



Fig. 1.—Thoracopagus monster. Anterior view.

ship of the skeletal structures is seen in the x-ray plate (Fig. 2). The twins are joined by a cartilaginous and soft tissue union extending from the xiphoid process of each sternum to the common umbilicus and face each other in almost perfect apposition, with only a slight deviation anteriorly. The attachment of the single umbilical cord lies on the inferior surface and the cord pierces a thin fascial membrane somewhat elliptical in shape and measuring approximately 4 cm. in diameter. The baby to the right of the fused portion is termed "right Twin-A"; the baby to the left, "left Twin-B." The external measurements of the specimen are given in Table II.

Right Twin-A appears to be somewhat smaller and lies a little lower than left Twin-B. The vertebral column is complete in each infant, and the thorax of

Twin-A is united to that of Twin-B by a bridge of cartilage incorporating the first ten ribs and the body and xiphoid portions of the sternum. The eight extremities are complete and intact and present no anomalies. Unfortunately, no palmar or plantar impressions were taken before the specimen was fixed in formalin. Both infants are females and their external genitalia are perfectly formed in each instance (see Fig. 3).

The umbilical cord is attached centrally to the single placenta; the membranes are complete and form one common sac. A cross-section of the cord reveals six umbilical vessels, two veins and four arteries. A right and left urachus enter the

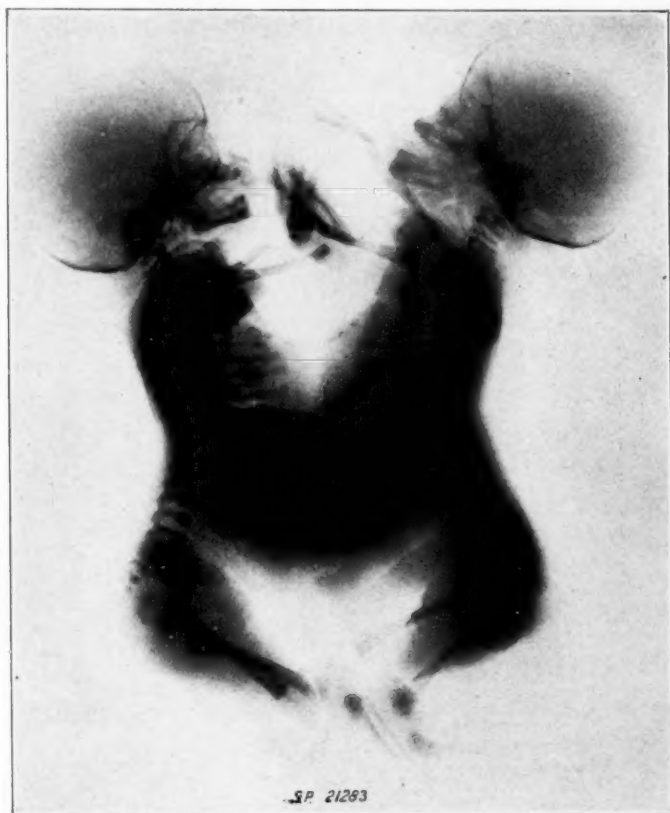


Fig. 2.—Roentgenogram.

root of the cord at its fetal insertion. The cord measures approximately 55 cm. in length and 2 cm. in diameter.

The classification of this monster is not difficult if one refers to Table I. Since the fusion has occurred both from above and from below and since each twin is fully formed, the specimen falls in the class of the *anakatadidyma*. In addition, it is representative of the omphalopagi since the twins are united in the thoracic and abdominal regions. Moreover, in this particular case, the union extends from the xiphoid process to the umbilicus, so that the term "thoracogastropagus" or "xipho-abdominopagus" would more accurately describe the present anomaly. However, in other descriptions of similar monsters the shorter name "thoracopagus" is usually employed to avoid redundancy and confusion.

TABLE II. EXTERNAL MEASUREMENTS OF COMPONENT TWINS

MEASUREMENTS	RIGHT TWIN-A	LEFT TWIN-B	
Crown-heel	46.0 cm.	46.0 cm.	
Crown-rump	29.5 cm.	30.0 cm.	
Transthoracic diameter		17.6 cm.	
Translumbar diameter		20.0 cm.	
Transsacral diameter		24.0 cm.	
Circumference of shoulders	32.0 cm.	54.0 cm.	31.0 cm.
Frontooccipital diameter	10.0 cm.		10.0 cm.
Mentoooccipital diameter	11.5 cm.		11.5 cm.
Suboccipitobregmatic diameter	11.0 cm.		11.0 cm.
Biparietal diameter	8.5 cm.		8.5 cm.
Bitemporal diameter	7.0 cm.		7.0 cm.
Feet (heel-toe)			
Right foot	7.5 cm.		7.5 cm.
Left foot	7.5 cm.		7.5 cm.

Dissection of this thoracopagus specimen was begun by making a skin flap in the anterior wall and reflecting the ribs to create a "window," as demonstrated in Fig. 4. A fused liver is encountered in the midline and occupies approximately

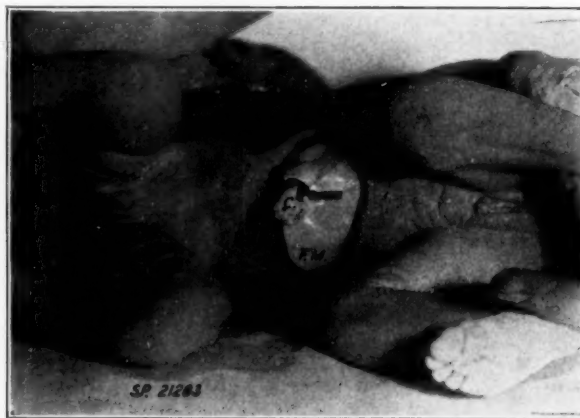


Fig. 3.—Perineal view showing external genitalia. Note attachment of cord (C) and fascial membrane (F.M.)

three-fourths of the abdominal cavity. A single thoracic cavity is separated by a fusion of the two diaphragms from a common peritoneal cavity. An apparent junction of the two abdominal cavities is represented by a line of peritoneal reflection along the anterior surface of the fused liver, which indicates the plane of fusion of the viscera of right Twin-A with the viscera of left Twin-B. Two umbilical veins are seen running from the single cord to pierce the anterior surface of the liver. The right umbilical vein sends a branch to the left vessel before entering the liver. The intestines lie inferior to the liver, filling a deep notch between the anterior and posterior surfaces of this organ.

The contents of the common thoracic cavity are of interest as they consist of two separate respiratory systems and a single conjoined heart covered by a common pericardium. A thymus gland overlies the base and great vessels of both the right and left portions of the fused heart.

The relationship of all these organs is well illustrated in Fig. 5 which is an anterior view of the entire visceral block. This was obtained by careful dissection beginning high up in the neck and descending along the posterior pleural and

peritoneal surfaces to the rectum in each infant, thus removing the viscera en masse. The resultant space was filled with a mixture of beeswax and paraffin, the fetuses supported by glass rods placed internally, and the specimen restored by sewing the bony thoracic plate and the abdominal skin flap into position.

The various organ systems were dissected separately and present several interesting anomalies. Their comparative sizes and weights are recorded in Table IV. The gastrointestinal tract is shown in Fig. 6. The esophagus and stomach of Twin-A are separate from the stomach and esophagus of Twin-B. Along the inferior



Fig. 4.—Dissection in situ. A skin flap and a portion of the chest wall have been removed to expose the thoracic and abdominal viscera. The conjoined heart (*H*), lungs (*L*) and the thymus glands (*T*) lie above the common diaphragm (*D*). The fused liver (*F.L.*), a portion of intestine (*I*), the right kidney (*K*) of Twin-A, and the spleen (*S*) of Twin-B are seen lying in the peritoneal cavity. The umbilical veins (*U. V.*) enter the anterior surface of the liver. Above their point of entrance, the line of peritoneal reflection is indicated.

pyloric surfaces, a right and left pancreas are visible. The duodenum of Twin-A joins the duodenum of Twin-B to form a common jejunum which continues downward without interruption into a single ileum. At a point 77 cm. below the fusion of the duodena, the common single jejunoileum separates into a right and a left ileum, the former traveling 42 cm. and the latter 50 cm. before reaching their

respective cecums. The point of divergence is indicated in the photograph, which also demonstrates the right and left appendix and in each infant a complete large intestine. The measurements of the partially fused gastrointestinal tract are found in Table III. No gallbladder is present in either twin.

TABLE III. MEASUREMENTS OF THE GASTROINTESTINAL TRACT

ORGAN	RIGHT TWIN-A	LEFT TWIN-B
Esophagus	9.0 cm.	10 cm.
Stomach	4.0 cm.	4 cm.
Pancreas	3.5 cm.	4 cm.
Duodenum	2.5 cm.	3 cm.
Common jejunoileum	77 cm.	
Ileum	42.0 cm.	50 cm.
Appendix	3.5 cm.	4 cm.
Colon	37.0 cm.	40 cm.

The genitourinary system is separate and distinct in each baby, as indicated in Fig. 7. The adrenal glands remain attached to their respective kidneys. The uterus, tubes, and ovaries are clearly defined in this posterior view, and in each instance

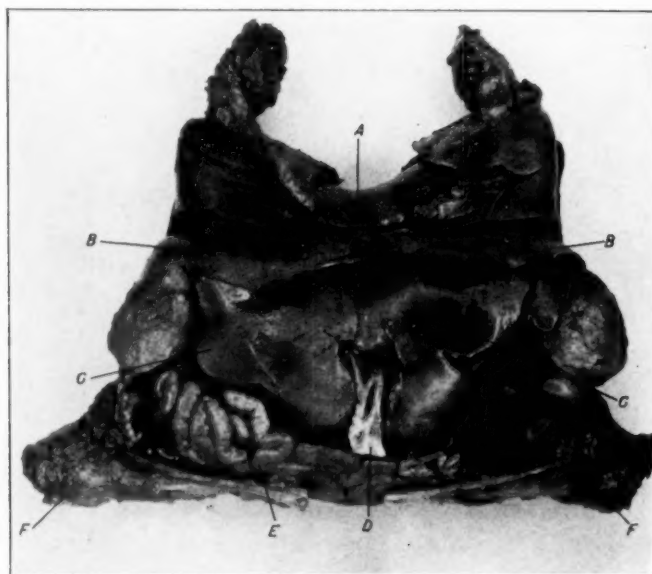


Fig. 5.—Visceral block, anterior view. Note conjoined heart (A) in midline above common diaphragm (B) and fused liver (C). The umbilical veins (D) can be seen entering the anterior surface of the liver, inferior to which lie the small intestines (E) and the two rectums (F).

the urachus can be seen projecting from the anterior surface of the bladder. In Twin-A the rectum is included to illustrate the aberrant vein which runs parallel to the ureter and left ovarian vein and joins the venous drainage of the left kidney. No similar anomaly is found in Twin-B.

The respiratory system consists of a pair of lungs in each twin supplied by a separate trachea. Three lobes are present in each of the lungs, all of which show some degree of fetal atelectasis. The pulmonary vessels will be considered in a discussion of the circulatory system. The right lung of Twin-A and the left lung of Twin-B are shown to advantage in Fig. 5. The comparative size of the lungs and tracheas are recorded in Table IV.

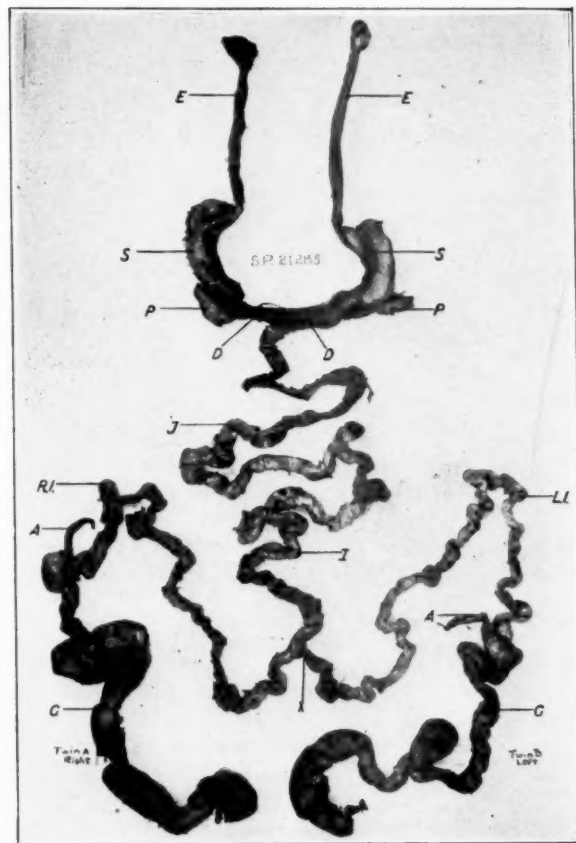


Fig. 6.—Intestinal tract, complete. Note fusion of the right and left duodenum (*D*) to form a common jejunum (*J*) and ileum (*I*). Also note separation of ileum (*X*) further along the canal into right and left ileum (*RI* and *LI*) with appendix (*A*) and large intestine (*C*) in each twin. Esophagus (*E*), stomach (*S*), and pancreas (*P*) are present in each twin.

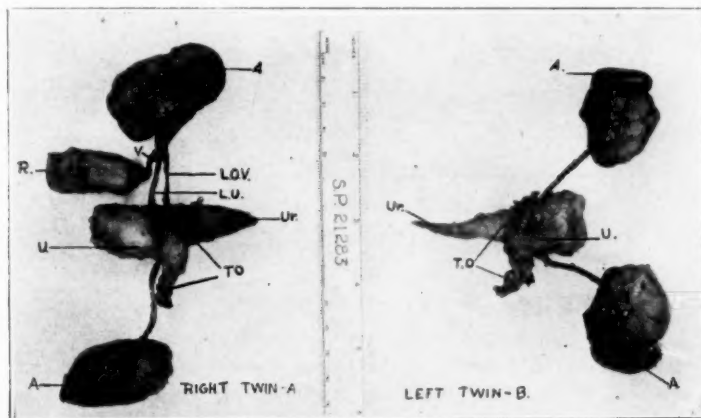


Fig. 7.—Genitourinary systems, posterior view, showing uterus (*U*), tubes and ovaries (*T. O.*), and urachus (*Ur*) in each twin. Note aberrant vein (*V*) from the rectum (*R*) of Twin-A, running parallel to the left ovarian vein (*L.O.V.*) and left ureter (*L.U.*). The adrenal glands (*A*) remain attached to the kidneys.

Dissection of the cardiovascular system also presents several interesting anomalies as demonstrated in Figs. 8 and 9. In brief, these findings may be summarized as follows:

The heart is composed of two units, one contributed by each twin. The musculature of this conjoined heart is fused from the bases to the apices. Separate and distinct arterial systems for each fetus arise from the right and left portions of the conjoined heart. Both the heart and aorta of Twin-B appear more fully developed than the corresponding organs of Twin-A. A sinus venosus on the inferior

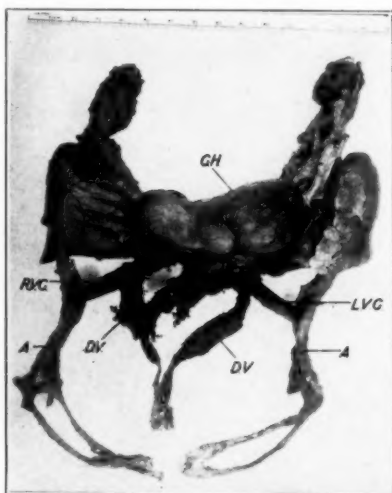


Fig. 8.—Cardiovascular system. The neck organs and lungs are shown, together with the conjoined heart (*CH*) and the two aortae (*A*). The liver has been dissected away to expose the intrahepatic circulation. Note the right and left vena cava (*RVC* and *LVC*), respectively. The cavae empty into a common sinus venosus.

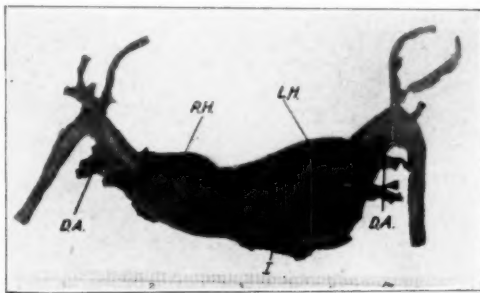


Fig. 9.—Anterior view of isolated heart. The veins have been removed to demonstrate the branches of the two aortae. Note incisura (*I*) marking the point of fusion of the right and left hearts (*RH* and *LH*). The ductus arteriosus (*D.A.*) is indicated in each instance.

cardiac surface receives blood from the right and left inferior venae cavae and delivers it into a common auricular chamber. This common atrial cavity also receives blood from the superior venae cavae and from the pulmonary veins of each infant. Moreover, this undifferentiated atrium empties directly into the ventricular chambers which intercommunicate freely with one another and with the two aortae. A more detailed report of the origin of the great vessels and the endocardial reflections of this fused "cor biloculare" will be made in a later publication.

TABLE IV. COMPARATIVE SIZE AND WEIGHT OF ORGANS

ORGAN	TWIN-A	TWIN-B
Trachea	4.50 cm.	5.00 cm.
Right lung	5.00 cm.	6.00 cm.
	14.00 gm.	10.50 gm.
Left lung	5.75 cm.	5.50 cm.
	13.00 gm.	13.50 gm.
Thyroid gland	2.00 gm.	1.50 gm.
Thymus gland	7.00 gm.	10.00 gm.
Spleen	3.00 gm.	4.50 gm.
Liver	10 x 9 x 8.5 cm.	
Conjoined heart	33.0 gm.	

DISCUSSION

Sternopagi and thoracopagi are the commonest forms of double monsters. Heil⁸ mentions 220 such cases reported in the literature up to 1921. Mudaliar⁹ collected nine specimens from the Giffard School of Obstetrics in Madras, India. He attended the delivery of four of these cases which occurred among 25,000 deliveries between 1920 and 1928. Six of his specimens were females, two were males and in one no mention of sex was made. Meckel found 60 females out of 80 sternopagi. The genitalia were always separate in each twin.

A single thoracic cavity is common to these monsters and usually contains a double set of lungs, a single pericardial cavity, and a conjoined heart. The degree of fusion of the cardiac components may vary from the union of a portion of the aorta to an almost complete amalgamation of the auricular and ventricular musculature, forming one common bulblike chamber. The peritoneal cavity is most often a common one and usually bounded by a fused diaphragm above and a common pelvic cavity below, though the two pelves may be separate and distinct. Partial or complete fusion of the two livers is a common finding, and the intestinal tract almost always shows some embryologic union in part of its course.

The question of surgical separation of conjoined twins depends, therefore, upon the degree of fusion and the nature of the union. The external appearance alone may be quite deceiving and suggest merely a soft tissue or a cartilaginous bond, yet in the majority of such cases there is a far more intimate visceral union, usually in the cardiovascular system, perhaps in the form of a common auricle. The original Siamese twins, who lived to be sixty-three years old, and each begat normal children, were found at autopsy to be joined by a tongue of liver tissue occupying a narrow isthmus lined by peritoneum.

Very little can be said from the clinical point of view, and it is indeed fortunate that the occurrence of double, conjoined monsters is rare. Inasmuch as the cause of monster formation is not known, nothing can be done by way of prevention. Endometritis and maternal endocrinop-

athies should be given due consideration. If maternal syphilis is present it should be treated. Knowledge of the part played by heredity is uncertain and still remains a controversial subject. However, if there is a family history of twinning and the signs of a multiple pregnancy are present, an antepartum x-ray should be taken in the hope that the extent of the visceral and osseous union will produce a shadow diagnostic of a conjoined fetus, if such a condition exists in utero.

Double monsters have never been diagnosed before labor, though the presence of twins has frequently been established in such cases. Not until dystocia develops in the second stage of labor has the presence of united twins been ascertained, and then only by means of vaginal or intrauterine examination. The majority of gross fetal malformations rarely go to term and such a pregnancy tends to abort spontaneously, so that the delivery of a premature monster may present no special obstetric problem. On the other hand, the presence of a fully formed conjoined double fetus at once creates an impasse of the most delicate proportions and one with far-reaching and dangerous aspects to the mother.

If the diagnosis of monstrosity can be made antepartum, the pregnancy should be interrupted by the induction of premature labor. Above all, a careful and thorough examination to determine the type and extent of the fetal union must be made before delivery is initiated. Sometimes, the extreme elasticity of the connection between the fetuses will permit a version and breech extraction of the second twin after delivery of the first. But this must be an extremely rare condition. If the dystocia is of short duration, by the time the diagnosis of monstrosity is established, cesarean section may be attempted. There are a few cases on record where this type of operative interference has been successful as far as the mother's outcome was concerned. However, in cases of long-standing dystocia, especially where the monster has become impacted in the birth canal, embryotomy is indicated. No consideration should be shown a monstrosity when the mother's life is in danger. In such extreme cases, general dismemberment of the fetuses is imperative.

SUMMARY

The specimen of the case herein reported consisted of two female infants united by a thick band composed of cartilage and soft tissue extending from the xiphoid process of each fetus to the common umbilicus. The thorax contained four pleural cavities, a single pericardium, a conjoined heart, and two thymus glands. A common diaphragm separated the thoracic structures from a single peritoneal cavity, the peritoneum being continuous throughout with the exception of a thin reflection for a short distance over the anterior surface of the fused liver. No gall-bladder was encountered during the dissection. The gastrointestinal

tract was characterized by a fusion of the right and left duodena to form a common jejunoileum, which further on divided into a short right and left ileum with a separate and distinct cecum, appendix, colon, sigmoid, and rectum in each infant. The genitourinary system was complete and intact in each case. In Twin-A, an aberrant vein from the rectum joined the left renal vein. The two pulmonary systems presented no anomalies other than the presence of three lobes in each of the lungs. However, the embryologic defects in the cardiovascular system were very pronounced and gave rise to a circulatory incompatibility. There was almost an entire absence of the interauricular and interventricular septa in each heart and between the two hearts, so that the eight cardiac chambers, the four auricles and the four ventricles, were found to be in complete and intimate communication with one another and with both the systemic arterial and venous blood, as well as the pulmonary circulation. A patent ductus arteriosus and a patent ductus venosus were present in each twin. The single umbilical cord attached to a common placenta contained six vessels, two umbilical veins and four arteries, normal in origin and distribution. No examination of the central nervous system was made.

As far as can be ascertained, there is no similar specimen reported in the literature that was delivered alive at full term without either operative or instrumental interference. In the present case the conjoined heart, the fused liver and diaphragm, and the partially fused intestinal tract would have made surgical separation of the twins entirely out of the question had the monster survived.

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ANALYTICAL STUDY OF THE RESULTS OF OPERATIONS ON
THE CERVIX UTERI WITH SPECIAL REFERENCE
TO STRICTURES*

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(From the Clinic of the Woman's Hospital)

THIS paper is an evaluation of the results of 261 operations on the cervix performed by 19 different surgeons at Woman's Hospital, together with certain comments on cervicitis and its operative treatment.

In the middle of the last century there was great confusion in the conceptions of cervicitis and its treatment. Powerful chemical caustics, such as pure carbolic or nitric acid, live steam, etc., were in common use. Many surgeons amputated the cervix without sutures. Sims, in 1859, was probably the first to stitch over the stump with a mucosal flap. His successor, Emmet, opposed amputation for many years and invented and popularized trachelorrhaphy, eventually recognizing, however, the superiority of amputation in certain cases, and thereafter devising a technic which was widely adopted and which is still in general use.

Schroeder, over fifty years ago, recognized the importance of excision of the infected endocervix as well as of the cystic hypertrophied tip and split the cervix wide open laterally to better accomplish this, suturing over the stump.

In 1893 Bouilly described a technic which attempted removal of almost all of the endocervix, his excision extending to within 1 cm. of the internal os. He packed, but did not suture, the cervix, allowing it to granulate.

Following the rational ideas of Schroeder and Bouilly another Frenchman, Pouey, about 1900 went a step further and enucleated an "endocervical cylinder" up to the internal os, excising the entire endocervix by a technic quite similar to that developed independently some years later by Sturmdorf. Pouey attempted to draw the cervical cuff of mucosa into the canal by a continuous suture.

In this country during the latter part of the last century the popularity of Emmet's trachelorrhaphy and amputation grew steadily despite occasional reports of cervical dystocia following the latter. Then came Leonard in 1913 with a paper on the results of twenty years of high amputations of the cervix at Johns Hopkins Hospital. His major conclusion was very disturbing; that "pregnancy following an amputation has not more than an even chance of progressing to full term, in which event serious dystocia due to cicatricial rigidity of the cervix will commonly be encountered." In the following year he reported a comparative study of the trachelorrhaphies done at Hopkins and concluded that, "Trachelorrhaphy has no influence upon the course of subsequent pregnancy; labor after it is almost normal." These reports attracted wide attention and led many surgeons to discontinue amputations of the cervix.

In 1915 Sturmdorf's paper appeared and created a deep impression on gynecologic thought and practice. His emphasis was all on the *infection* of the cervix rather than on the lacerations. His operative technic, tracheloplasty, ingeniously enucleated

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a cone of the entire endocervix and cystic glands, relining the canal by drawing in flaps of the mucosal sleeve of the outer wall of the cervix, and did not interfere with the musculature of the cervix. Such an operation should in no way affect the course of subsequent pregnancies or labors. This operation was widely taken up and tried out and is perhaps the most suitable technic for the childbearing age.

In 1921, Rawls made a thorough comparative study of amputations and trachelorrhaphies at Woman's Hospital, New York. He found that amputation and trachelorrhaphy were satisfactory operations when proper indications and technic were followed; amputation more efficient than trachelorrhaphy in curing leucorrhea and dysmenorrhea, but causing more premature labors and abortions if done high; dystocia was found more often after trachelorrhaphy.

In 1921 cauterization of the cervix, formerly suggested by Hunner, was brought vigorously to the attention of the profession by R. L. Dickinson. Unquestionably this procedure has cured many a case of cervicitis and greatly reduced the number of operations, but bad results were sure to follow its inexperienced use.

In 1928 Mathieu and Schauler issued a note of warning that not only caustics and operations but also cauterizations were producing an increasing number of true cervical stenoses. Curtis feels that the cautery knife is a potent factor in producing strictures of the cervix, particularly if repeated cauterizations are performed, or if the cautery knife carries too much heat, or goes high within the canal.

In 1931 Wolfe studied microscopically the excised endocervical cones of the Sturmdorf tracheloplasties of Long Island College Hospital and found that in some of these operations the surgeon had not removed the uppermost infected glands near the internal os, contrary to the advice of Sturmdorf and, therefore, leucorrhea would probably persist in these cases.

Maryan of Chicago cultured the ground-up cervical glands of excised cones of the Sturmdorf operation and grew consistently in 80 per cent of the cases the same streptococcus.

From these two excellent pieces of research alone, it seems but simple logic to conclude that the entire endocervix must be enucleated if the infection is to be thoroughly eradicated. Certainly this is highly desirable from the viewpoints of both the patient and the surgeon. The patient seeks a cure of the leucorrhea and perhaps also the removal of this possible cause of sterility. The surgeon not only seeks these results but in the light of cancer studies realizes another responsibility more than ever before. I refer to the potential cancer menace that resides in every chronic cervical infection.

Competent pathologists and gynecologists everywhere have become convinced that the tissue changes of chronic cervicitis are undeniably precancerous. Bailey, in a careful inquiry into the basic cause and nature of cervical cancer made histologic examinations of 850 cervixes removed at operation, concluding that "the ultimate sequel to erosion is malignancy." Ewing believes that cancer arises only on tissue which has become altered by chronic irritation. J. E. Davis reporting on biopsies of 1,200 cervixes stated that, "cervixes that are not lacerated or infected rarely, if ever, become malignant. The constant appearance of the area of malignancy exhibits injury, irritation, infec-

tion, derangement of cells and undue growth stimulation." Pemberton says that, "of 675 cases of cancer of the cervix seen at The Brookline Free Hospital only about 2 per cent had had previous repair of the cervix."

About ten years ago, diathermy was introduced by Corbus and O'Connor, Cherry and others. By this method electrical heat of varying degrees can be applied to the chronic cervical inflammation by an active electrode introduced into the canal. Low heat, below 114° F., so-called medical diathermy, may be used, or a higher degree of heat, destructive and coagulating, called surgical diathermy or electrocoagulation. In 1929 Scheffey and Schmidt, reporting on a series of acute cases treated by the low heat, stated that increased circulation was the principal effect obtained and that a degree of heat which would not injure the tissues would not kill the bacteria. Kolischer, in 1930 showed that the gonococcus could stand more heat than the tissues would permit, and he, therefore, doubted the value of medical diathermy in acute infections. Surgical diathermy, on the other hand, has rapidly come into vogue and is employed rather extensively. Ende says of its advantages, "we kill tissue to a measured depth, . . . a slim cone of slough can be detached and removed on the third day leaving a clean surface which heals rapidly. Healing is prompt when the pathology is entirely eradicated, scar tissue is negligible and is softer than scars after cauterization." In only 2 of his 200 cases was there enough scar contraction of the canal to require dilatation.

About six years ago Hyams devised a method of enucleating the endocervix which he named conization. Employing a cutting current passed through a wire loop on an insulated rod, the entire diseased area in and about the cervical canal is coned out at one sitting.

Roblee feels that electrocoagulation will probably replace the Sturmdorf operation for the chronic cystic group. His cases showed as good healing and turning in as a series of 50 Sturmdorf operations he observed. Moench, after treating 100 cases by electrocoagulation considered it "markedly superior to surgery as no inelastic scar remains." Two cases of stenosis that he produced resulted from the use of too heavy a current, due to inexperience. Royston and Roblee have been particularly interested in this question of scarring following electrocoagulation and took histologic sections of a number of cases which showed the surface of the endocervix covered with squamous epithelium and no scar tissue microscopically recognizable.

If this proves to be uniformly the end-result after electrocoagulation, it may eventually displace surgery of the cervix. The simplicity, the brevity and the effectiveness of both electrocoagulation and the Hyams conization commend them highly, but the type of *scar resulting is the crux of this whole matter* and must be determined beyond debate. We know that wherever there is necrosis or wherever a wound is left open to granulate, connective tissue (scar tissue) of varying thickness is laid down. It would seem that this should be expected after conization or electrocoagulation. F. C. Wood, in a personal communication, feels that this type of wound is no exception. This is what happens when the stitches give way and the flaps open up after a cervical operation. It seems to me that immediate relining of the canal by well-placed Sturmdorf flaps would logically be expected to leave less scar than would follow the four or five weeks required for complete epithelialization of the cervical canal after elec-

trocoagulation, as estimated by Royston and Roblee. We have yet to learn how readily these cervixes will dilate in labor, no considerable series of such labors having been reported. Hyams knew of no difficult or prolonged labors among the 27 patients who became pregnant after his conizations.

As to the course of labor following the Sturmdorf operation, the following reports are important to note. Sovak saw one cervical dystocia in 28 labors after Sturmdorf tracheloplasties; Burns reported 15 normal labors without dystocia after that operation; Matthews reported 3 cases of moderate cervical dystocia, all 3 delivered normally, in 20 labors after tracheloplasties; and at Woman's Hospital in my series there was one moderate dystocia in 9 labors after the same operation.

It was Curtis' paper on cervical stricture which aroused my curiosity concerning the results of the surgery of cervicitis; I, therefore, made a survey of our cervix operations at Woman's Hospital, New York. I sent for 700 patients upon whom amputations, trachelorrhaphies, or tracheloplasties had been performed. There were 261 patients who returned to our Follow-Up Clinic, all of whom were examined by me personally. These operations were performed by 19 different surgeons. A few of these patients were operated upon nearly ten years ago but the majority within the last six years. In addition to getting a postoperative history I examined every cervix manually, by probe, or by intrauterine sounds to determine as accurately as possible the amount of scar tissue present, the degree of stenosis, and the presence of endocervicitis.

Aldridge, in a series of several thousand Rubin tubal insufflations was able to pass a cannula through the cervical canal in nearly 99 per cent of patients who had not been operated upon. My intrauterine sounds were smaller than the Rubin cannula and would certainly pass through any unstricted cervix, with the exception perhaps of a rare case of senile atrophy.

The results of follow-up studies on the 261 patients are best given in Tables I to X.

TABLE I. TYPES OF OPERATION

	CASES
Low amputation	99
Average age 36	
High amputation	59
Average age 47	
Sturmdorf tracheloplasty	53
Average age 34	
Trachelorrhaphy, unilateral or bilateral	50
Average age 34	
	261

Table I shows the number of each operation done. The reader should note that the average age of the patients upon whom a high amputation was performed was forty-seven years of age. Obviously this type of operation has been used mostly on those patients in whom pregnancy was impossible or improbable. These figures also show that low amputation leads in popularity for use on women in the child-bearing age.

TABLE II. CURE OF LEUCORRHEA

	PER CENT
High amputation	100.0
Sturmdorf	92.6
Low amputation	87.8
Trachelorrhaphy	74.0

Table II shows the effectiveness of the different operations in the cure of leucorrhea. Of the 59 patients I examined, upon whom high amputations had been performed, not one had leucorrhea. Admitting that there must be an occasional failure of this operation to cure a cervical leucorrhea, nevertheless one cannot but be impressed by its effectiveness. Both the Sturmdorf tracheloplasty and low amputation were found to have cured leucorrhea much more often than the lateral trachelorrhaphies.

TABLE III. STENOSIS

	PER CENT
High amputation	54.0
Low amputation	18.0
Trachelorrhaphy	12.0
Sturmdorf	1.8

Table III tells the tale of postoperative stenosis; indicating high amputation with the very bad record of 54 per cent, and giving the Sturmdorf tracheloplasty almost a perfect score.

TABLE IV. STENOSIS AFTER HIGH AMPUTATION
32 CASES, 54.2 PER CENT

	CASES
Impassable by probe	23
Menstruating normally	6
Obstructive dysmenorrhea	2
Hematometra or pyometra requiring operation	2
Menopause	13
Partial stenosis	9
Menstruating normally	2
Obstructive dysmenorrhea	2
Menopause	5

Table IV shows that of those cervixes so badly stenosed as to be impassable to a probe, 56 per cent were in women past the menopause,

thereby lessening probable evil consequences. Only 4 patients had serious trouble in the form of obstructive dysmenorrhea, pyometra, or hematometra, 2 requiring operative surgical dilatation, the others permitting the menstrual blood to leak out satisfactorily. Nine other patients in this group of high amputations, or 15 per cent, had lesser stenoses, passable by a sound, and only 2 had moderate dysmenorrhea of the obstructive type.

TABLE V. STENOSIS AFTER LOW AMPUTATION
18 CASES, 18 PER CENT

	CASES
Impassable by probe	7
Menstruating normally	4
Obstructive dysmenorrhea	1
Hematometra or pyometra	0
Menopause	2
Partial stenosis	11
Menstruating normally	9
Obstructive dysmenorrhea	1
Menopause	1

Table V indicates that even low amputations are followed by a not inconsiderable percentage of stenoses. Though I could not pass the smallest probe in 7 of these patients, 4 of them menstruated normally, presumably through a tortuous cervical canal, 2 were past menopause, and only 1 was so badly strictured as to have an obstructive type of dysmenorrhea. In the group of 11 minor stenoses, patent to a probe, 9 patients menstruated quite normally, only 1 having a moderate obstructive dysmenorrhea.

TABLE VI. STENOSIS AFTER TRACHELORRHAPHY
6 CASES, 12 PER CENT

	CASES
Impassable to probe	2
Partial stenosis	4
Obstructive dysmenorrhea	0
Menstruating normally	5
Menopause	1

STENOSIS AFTER STURMDORF OPERATION
1 CASE, 1.8 PER CENT

Partial stenosis, with normal menses

Table VI shows that though there occur 12 per cent stenoses after the Emmet trachelorrhaphies of this series, there was no case of obstructive dysmenorrhea. It also records the striking fact that in the 53 Sturmdorf tracheloplasties only 1 postoperative stenosis occurred, and it was not of the troublesome type.

TABLE VII. PREGNANCY AFTER HIGH AMPUTATION
4 CASES

	CASES
Full-term normal labor	0
Premature labors	2
Presumably caused by amputation	
Cervix dilated at 35 and 36 weeks	
Abortions	2
Spontaneous at third and fifth months	
Amputation only assignable cause found	

Turning to the histories of the pregnancies following these operations we see in Table VII that not one of the 4 pregnancies that occurred in my series of 59 high amputations went to full term. There were 2 premature labors, both probably caused by the operation, as the cervix of each patient was considerably dilated one month before term. Two patients aborted spontaneously at the third and the fifth month, respectively, perhaps from the lack of cervical protection. At any rate, no other cause could be found in the history of either patient. Vaginal examination had not been made just before these abortions, therefore the condition of these cervixes was unknown.

TABLE VIII. PREGNANCY AFTER LOW AMPUTATION
12 CASES

	CASES
Full-term normal labors	8
Premature labors	4
One due to amputation, others not definitely	
Cervical dystocia	0
Abortions	0

Table VIII reports on 12 pregnancies after low amputations. Eight full-term normal labors occurred; no case of cervical dystocia and no abortions. Premature labor occurred four times. Only 1 case was due definitely to the cervical operation. This patient had one finger dilatation of her cervix at the twenty-seventh week, her membranes ruptured spontaneously at home at the thirty-third week, followed by a one and three-fourths hour labor in Woman's Hospital with the spontaneous birth of a 3¼ pound live baby. Investigation of the histories of the other 3 cases failed to fix the blame for the premature onset of labor upon the prior cervical operation.

TABLE IX. PREGNANCY AFTER TRACHELORRHAPHY
13 CASES

	CASES
Full-term normal labors	9
Premature labors	3
No proof cervix operation the cause	
Labor with cervical dystocia	1
Manual dilatation rigid scar required	
after 24 hours' labor	
Abortions	0

In Table IX, of 13 cases of pregnancy after trachelorrhaphy, 9 full-term normal labors are listed. There were 3 premature labors, none of which could be definitely blamed upon the previous operation. One other patient had a severe cervical dystocia. Her rigid unilateral scar was unyielding, tore partially after twenty-four hours of labor and finally had to be dilated manually. No abortions occurred after trachelorrhaphy.

TABLE X. PREGNANCY AFTER STURMDORF TRACHELOPLASTY
10 CASES

	CASES
Full-term normal labors	8
Premature labors	0
Possible cervical dystocia	1
After 40 hours' weak pains, spontaneous delivery.	
Cause—rigid scar? weak pains?	
Abortion, at fifth month	1
Cause undetermined	

Table X enumerates 10 pregnancies occurring after Sturmdorf tracheloplasties. Eight of these terminated as normal labors and none was premature. One aborted at the fifth month from an undiscovered cause, possibly the cervical operation. Another patient delivered spontaneously at term after forty hours of "weak pains." Whether the delay was caused by the resistant cervix or by the poor quality of the contractions was undetermined, but the cervix was not blamed in the records.

SUMMARY AND CONCLUSIONS

1. A series of 261 patients operated upon by 19 surgeons at Woman's Hospital during ten years for chronic cervicitis and lacerations, is presented for study of ultimate results.
2. For the cure of cervical leucorrhea high amputation is perfect, Sturmdorf operation excellent, low amputation very good, and trachelorrhaphy disappointing.
3. Varying degrees of cervical stenosis followed high amputation in 54 per cent of the cases, low amputation in 18 per cent, trachelorrhaphy in 12 per cent, and Sturmdorf tracheloplasty in 1.8 per cent.
4. Twenty-three out of 59 cervixes repaired by high amputation were impenetrable by a probe, yet only 2 had obstructive dysmenorrhea. Only 2 out of 59 operated upon required operative dilatation later.
5. There was much less stenosis after low amputation (18 per cent); only 2 per cent obstructive dysmenorrhea. No obstructive dysmenorrhea after trachelorrhaphy.
6. The Sturmdorf operation gets a well-nigh perfect record of non-interference with subsequent pregnancies and labors.

7. One case of serious cervical dystocia followed a unilateral trachelorrhaphy, and this type of operation may have caused a premature labor in another; but there were 9 entirely normal labors in patients who had a previous trachelorrhaphy.

8. No dystocia, no abortions followed low amputations, and there were 8 normal labors; but this operation was the cause of at least 1 premature labor and perhaps of 3 others.

9. Of 4 pregnancies after high amputations 2 terminated in premature labors and 2 aborted from undetermined causes, a bad record.

10. Diathermy may replace surgery in the treatment of chronic cervicitis; but only if it will eradicate the entire diseased area as dependably as a knife and show a better record in subsequent labors than the Sturmdorf operation.

11. The degree of scarring following diathermy has not been sufficiently demonstrated.

30 EAST SEVENTY-SIXTH STREET

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DISCUSSION

DR. ARTHUR H. CURTIS.—If my experience is any criterion, the number of cervical obstructions must be legion. I wish to mention only one complication which has not been accorded the attention it merits. This is produced by a back-flow into the uterus and through the tubes, oftentimes even into the peritoneal cavity, due to the damming back of secretions and menstrual flow incident to more or less complete obstruction of the cervix or lower uterine segment. Although this trouble is uncommon, it is sufficiently frequent so that if we have a given case of inflammatory-like trouble of the pelvis and can rule out the commonly encountered gonorrheal, postabortive, or puerperal infections, also endometriosis and tuberculous, the probabilities are that the patient has an obstruction of the cervix or of the lower

uterine segment. Upon opening the abdominal cavity and not finding the usual easily demonstrable causes of the inflammatory masses encountered, an obstruction of the uterus should be looked for.

If we discover endometriosis in a patient in whom the uterus is not and has not been retroverted, the cause of the endometriosis is always to be found in obstruction to outflow from the uterus.

DR. N. S. HEANEY.—I did two Sturmdorf operations shortly after the publication of his work. I coned out the cervix and then split the cervix as I would in doing an ordinary low amputation, in order to see what I had accomplished in the first step. I then felt convinced that when I split the cervix on each side and looked into it I could more thoroughly remove the diseased tissue under the guidance of the eye than I could by blindly removing a cone as in the Sturmdorf operation.

Here and there a small cancer is overlooked if you do a Sturmdorf routinely which would be recognized and treated more comprehensively if the cervix were split preparatory to doing an amputation.

DR. W. C. DANFORTH.—While the cautery is an exceedingly useful device in numerous cases, many do not understand its limitations. One should not cauterize too high; one should not place the cautery stripes too close together; one should not go too deep and one should not recauterize until a considerable time has gone by, and time should be measured in months, not weeks. I have seen three cases of cervical dystocia following cervical operations. I have also seen cases in which labor progressed exceedingly well. The obstetrician should not forget that trouble may follow in subsequent labors. I have always felt that unless there is definite indication the operation should be delayed until later, getting along with cauterization until the patient is beyond the childbearing period. About three months ago I saw a woman upon whom an operation for obstructive dysmenorrhea had been done by a man whose gynecologic experience was exceedingly small. This woman had a complete cervical obstruction. As she was nearly forty, the uterus was removed.

DR. FRED H. FALLS.—I have used the Sturmdorf operation for ten or twelve years and I have had several patients delivered spontaneously following the operation. Most of the leucorrhœas are cured. In a few cases considerable hemorrhage may occur if the stitches loosen several hours or days after operation.

I would like to emphasize the point that there are certain patients with constriction of the cervix who die of carcinoma. Some of these are not recognized until they have gone beyond operative or radium help. With cervical stenosis in which the carcinoma occurs in the cervical canal or body of the uterus above the obstruction there is no bleeding until the metastases are pretty well outside of the uterus. As bleeding is one of the earliest symptoms which brings the patient to the physician for diagnosis, the carcinoma is often totally unsuspected until very late.

A woman came in with a tight cervix and I did a Sturmdorf operation. The pathologic report was a beginning carcinoma. This shows the value of investigation of these cones that one removes in the Sturmdorf operation.

DR. JOSEPH L. BAER.—In my own practice I have limited the operations on the cervix in recent years to the Sturmdorf procedure and to trachelorrhaphy; the former to those patients in whom the cervix is grossly infected as well as injured, and the latter if the cervix is merely mechanically injured. I think high amputation is definitely a poor procedure and should be omitted.

I believe the success of the cautery depends entirely on the selection of cases and the technic. It is our practice to do the cautery procedure in one sitting and rarely have we found it necessary to recauterize. I do not believe it wise to leave

too wide a gap between the radial cauterization. For endocervicitis, we use the long platinum loop. The mucus must first be digested away with a pepsin powder and then, if there is a little bleeding, hemostasis is accomplished with adrenalin. Those details of the technic are essential to satisfactory one-stage cure of endocervicitis and erosion. It is unwise to select for office treatment those patients who have a narrow cervix. Dilatation must precede cauterization.

DR. EMIL RIES.—We have heard that laceration of the cervix is a source of carcinoma. I have been unable to find primary carcinomas in any lacerations. All the carcinomas that are early enough so that their location could be differentiated carefully are found in any location except the lacerated part. The laceration itself never in my experience is the seat of carcinoma. We have also been told that inflammation of the cervix is a fruitful source of carcinoma and that, therefore, all endocervicitis cases have to be treated. If we consider the enormous numbers of cases of endocervicitis in comparison with the number of carcinomas, we find an insignificant percentage of carcinoma. On the other hand, if we see early cases of carcinoma it is not at all the rule to find an endocervicitis associated with the carcinoma. In my experience I do not recall a single case. All these vague statements that laceration and inflammation of the cervix cause carcinoma are unproved. If we compare the trauma to the cervix which occurs in the natural course of its function with traumas in other parts of the body where the pathology stands out very readily, the cervix certainly does not suffer as much traumatism as the perineum and vagina, and carcinoma in the vagina and perineum is insignificant as compared to carcinoma of the cervix.

DR. BULLARD (closing).—Dr. Ries has brought up some knotty problems about cancer production. The conditions present in the parous cervix include trauma plus the constant irritation of chronic inflammation for years and years. This is fertile soil for the growth of cancer.

The Schroeder operation is seldom done at the Woman's Hospital. If a cervix is first dilated well, a conical enucleation of the infected gland-bearing area can be done without leaving any cystic or inflamed tissue. My objection to the Schroeder operation is that one has difficulty in getting a good plastic adjustment of the tissues after the wedge excisions. Dr. Heaney prefers not to excise the glands near the internal os. Sturmdorf feels that this is the cause of the persistence of leucorrhea, and insists that we enucleate the endocervix up to and into the internal os, as those higher glands are often infected. In Wolfe's study of the excised cervical cones of the Sturmdorf operations performed at Long Island College Hospital, he found that in a certain number the infection had not been entirely eradicated near the internal os.

Dr. Baer thinks that we might well discard high amputation. It seems to me that in a case with great hypertrophy, very deep lacerations, severe infection, marked eversion, etc., especially in a patient past childbearing, high amputation secures the best result, despite the risk of stricture that may require dilatation later.

I rarely do a trachelorrhaphy. Why excise a clean scar if there is no attendant infection? Carcinoma does not develop in scar tissue but in areas of chronic inflammation.

Dr. Ries insists that we have no proof that chronic cervical inflammation is what produces the cancers. However, the pathologists are constantly pointing out that though there is a missing link in the chain between chronic inflammation and cancer, nevertheless the appearance of the cells, their arrangement and other characteristics of the tissues are very close to the picture seen in the earliest cancer changes. James Ewing said that carcinoma practically never develops in tissues where there is no irritation.

VARIATIONS OF SERUM CALCIUM AND PHOSPHORUS DURING PREGNANCY

II. THE EFFECT ON THE OCCURRENCE OF DENTAL CARIES

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THE old adage "a tooth for a child" has become so firmly fixed in tradition that it is rather generally accepted as a fact, both by the laity and the professions. Contrary to popular belief, however, there is little authentic evidence on which to base such a conclusion. This study was undertaken for the purpose of investigating the condition of pregnancy to see whether it, or the variations in serum calcium and phosphorus resulting from it, had actually any direct bearing upon the occurrence of caries or the general breaking down of the teeth.

In order to determine the extent of the changes occurring during the course of pregnancy, we made oral examinations at intervals of six weeks on pregnant patients visiting the dispensary. These examinations were begun as early in the pregnancy as the cases were available, averaging about the third month, and were continued until delivery. Whenever possible a final examination was made at the time of dismissal of the patient, five to seven weeks postpartum. No treatment or restorative work was attempted, although a certain amount of cleaning was at times necessary.

The method consisted in the use of the dental explorer or pick, aided by a chip blower, used to drive saliva and debris from the teeth. A mouth lamp was employed for transillumination, to detect cavities between the teeth. All findings were recorded on charts prepared especially for the purpose. In a large number of cases x-rays were made at the time of the first examination, and these were repeated at the postpartum dismissal with all the patients willing to come to the hospital for that purpose. A careful study of these x-ray films, both prenatal and postpartum, failed to reveal any areas of decay not recorded from the oral examination. While making due allowance for our good fortune in this complete confirmation, we feel that it clearly indicates the reliability of the oral findings, whether corroborated by the x-ray or not.

We examined 358 prenatal patients in this manner, 215 of whom returned for the final postpartum check-up. Only 54, 15 per cent, of the prenatal cases showed any evidence of dental change during the period

of observation. In all, 70 changes were observed, distributed as follows: new cavities, 22; breaking down of old cavities, 17; breaking down of fillings, 11; pits and fissures, 20. Forty-two of the 54 patients had only one of the above changes, 8 had 2, 3 had 3, and 1 had 4. Of these changes the 20 grouped as pits and fissures is in all probability too high, since it would be very easy to overlook so small a defect in the first examination, especially with the teeth in the unhygienic condition usually encountered, and discover it later, recording it as a change. Once found and recorded, it could not have been overlooked in subsequent examinations, as all were checked against the preceding records.

Of the 215 examined postpartum only 13, 6 per cent, showed evidence of change, with a total of 16 incidences. From this series of examinations it is clearly evident that tooth destruction was not proceeding very rapidly during this period, even among those followed into the second month of lactation.

A study of the serum calcium and phosphorus was made during this same period on 49 of the 54 patients mentioned above who showed some evidence of dental change. Altogether 354 duplicate determinations were made on each substance. The results were compared against the range of normal variation of serum calcium and phosphorus in pregnant women, as determined from 4,760 duplicate determinations carried out at intervals upon 898 women during pregnancy.¹ Only 14 of the calcium determinations failed to fall within the range for that interval of pregnancy in which they were made. Seven of these fell above the range and 7 below. The 20 phosphorus findings which fell outside the range were also equally distributed, 10 above and 10 below. In no case were as many as half of the determinations made on any one individual outside the normal range of variation. The fact that, among the small percentage of pregnant women who showed evidence of active tooth destruction, there was nothing abnormal either in the calcium or in the phosphorus findings, strongly indicates that there is no direct relation between the calcium and inorganic phosphorus of the serum and the condition of the teeth.

Vomiting, a common condition of pregnancy, has been considered as a possible cause of tooth destruction. Of the 54 patients who showed active tooth decay, exactly half experienced vomiting in various degrees, while the others were free from it. On the other hand, 60 per cent of all the patients observed had vomiting, although only 15 per cent of the total showed active tooth decay. Vomiting cannot, therefore, be considered as a primary cause of caries.

The effect of the presence of *Bacillus acidophilus* is still an open question. If caries are due to the action of this bacillus, and if pregnancy promotes caries, then there should be an increasing concentration of the bacillus present in the mouth as pregnancy progresses. In order

to demonstrate this we made cultures at the time of each examination of the patient, of such material as could be removed from the base of the teeth with small sterile swabs, pressing the swabs particularly into any cavities or decayed areas. These cultures were raised under anaerobic conditions, in accordance with the method and hydrogen ion concentrations used by Bunting.² The results were contradictory. Some patients were negative throughout, others positive, but the majority fluctuated inconsistently. Our experience led us to the conclusion that *Bacillus acidophilus* was not fostered by the condition of pregnancy.

The possibility of an acid mouth was also considered, since we felt that it would be unwise to ignore the possibility of a change in the buffering power of the saliva during the period of pregnancy, even though recent investigators, as for example, Karshan, Krasnow, and Kiejci³ or Stern,⁴ have demonstrated that there is no direct connection between the P_H of the saliva and the formation of caries. The saliva was collected from the patients in small bottles at the time of each dental examination. After as little delay as possible an aliquot of this sample was suspended in N/100 sodium hydroxide and titrated against N/100 hydrochloric acid, using methyl red as an indicator. Again the results proved to be inconsistent—so much so that we finally abandoned this phase of the work, with the conclusion that there was no demonstrable increase in the titrable acidity of the mouth during pregnancy.

We did find, however, a general laxity in the oral hygiene as time went on. Especially following delivery, when the care of the child made an increased demand on the mother's time, less and less attention was paid to the care of the mouth. This condition would probably not hold true in other classes of patients; moreover, since it has been fairly well demonstrated that oral hygiene has little to do with the developing of caries in any case,^{5, 6} we do not feel that any particular importance should be attached to the observation.

Our conclusion that there is no direct relation between the teeth and the serum calcium and inorganic phosphorus levels during pregnancy is strongly supported by a study of the oral findings from the general examination made of the teeth of each patient. These findings have been arranged to show the relationship between age and the incidence of caries, and between the number of pregnancies and the incidence of caries. In this tabulation all third molars have been disregarded, whether present or not. This was done because many of the patients were too young to have their third molars in place, and because these teeth are frequently impacted and fail to erupt properly. The study is based on the conditions found in the remaining 28 teeth only. All teeth that showed restorative work were classed as carious; that is, a tooth with a filling was recorded as carious, as was also a tooth showing active decay.

The average number of missing and carious teeth found among the 465 patients examined is given in Table I, distributed according to the number of pregnancies. If bearing children is a major cause of tooth destruction, there should be a consistent rise in the average number of missing and carious teeth with the number of pregnancies experienced. No rise of any magnitude can be demonstrated. The small tendency which might be considered present, if the higher paras were only a few cases were available are disregarded, can easily be explained

TABLE I. MISSING AND CARIOUS TEETH. DISTRIBUTED ACCORDING TO THE NUMBER OF PREGNANCIES

PARA	I	II	III	IV	V	VI	VII-X
Number of cases	232	120	51	23	15	15	9
Average number of missing teeth	1.62	2.24	2.64	2.74	3.20	2.80	1.66
Average number of carious teeth	5.54	5.77	7.03	6.91	5.13	6.13	5.33

by the fact that those women with the larger number of children are on the whole the older. It will be noted that in Table II, where the distribution is made on the basis of age, there is a marked rise both in the number of carious and of missing teeth. This is in complete agreement with the work of Ziskin,⁷ who found a definite increase in the number of missing and carious teeth with age in both pregnant women

TABLE II. MISSING AND CARIOUS TEETH. DISTRIBUTED ACCORDING TO AGE GROUPS

AGE GROUPS	13 TO 17	18 TO 22	23 TO 27	28 TO 32	33 TO 40
Number of cases	45	220	131	50	19
Average number of missing teeth	1.04	1.51	2.62	3.62	3.63
Average number of carious teeth	4.11	5.24	6.41	7.88	8.21

and those who had never experienced pregnancy, but did not find any relation between the condition of the teeth and the number of pregnancies.

We collected data over the period of a year on unmarried women treated at the dispensary of the Dental School of Western Reserve

TABLE III. MISSING AND CARIOUS TEETH OBSERVED IN A GROUP OF NEVER PREGNANT WOMEN. DISTRIBUTED ACCORDING TO AGE GROUPS

AGE GROUPS	13 TO 17	18 TO 22	23 TO 27	28 TO 32	33 TO 40
Number of cases	35	40	18	2	6
Average number of missing teeth	3.40	2.27	2.11	2.50	7.33
Average number of carious teeth	10.60	14.00	13.94	14.00	22.16

University. These came from the same strata of social life as the patients supplying the data in Tables I and II. The examinations made in the Dental School were made by the dental staff, and, while a certain similarity of procedure was observed, there were certain differences in classification as regards restoration and areas of decay which no doubt

account for the wide divergence between Tables II and III. It is apparent, however, after making all due allowances, that the condition of the mouths of unmarried women of similar age and living conditions is no better than that of women who have had one or more children.

SUMMARY AND CONCLUSIONS

There is no appreciable change in the teeth of women during pregnancy or the first few weeks of lactation other than that which would probably occur in a similar group of nonpregnant women during the same period of time. Only 15 per cent of the cases studied showed change.

The levels of the calcium and inorganic phosphorus of the serum of the pregnant woman bear no direct relation to the condition of her teeth.

The vomiting experienced during pregnancy does not seem to have any effect on the incidence of dental caries.

Bacillus acidophilus was not found to be consistently present in the mouths of pregnant women, nor was it always maintained throughout the term of pregnancy in those mouths in which it had been found earlier.

There was no increase in the titrable acidity of the saliva of women during pregnancy.

A general laxity in the oral hygiene was observed, especially following delivery. This condition would probably not be true in other social groups, and may or may not have any bearing on the condition of the teeth.

There is no rise in the average number of missing and carious teeth with the number of pregnancies experienced. There is a distinct increase, however, with age. Examination of the teeth of unmarried women showed them to be no better than those of women who had borne one or more children.

It is evident that the condition of pregnancy as observed in this area cannot be considered a primary cause of tooth destruction.

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POSTURE AND DYSMENORRHEA

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FOR years sporadic interest has been shown in the possible relationship between faulty body mechanics and subjective symptoms. Early studies, though not entirely convincing, have nevertheless strongly suggested a cause and effect relationship. The connection between backache and posture, at first questioned, is now considered a common example of this cause and effect relationship. In the minds of orthopedic surgeons there exists little doubt concerning the importance of proper body mechanics. Without a balanced relationship symptoms develop. Apparent examples are numerous. The discomfort caused by fallen arches, scoliosis, kyphosis, etc., need not be discussed here. The importance of "good" posture is also considered a foregone conclusion. When we go beyond the realm of the orthopedist, however, this relationship is no longer so apparent. Indeed, it is largely hypothetical for it is based chiefly on impression and seldom on fact. Stimulated by the reports of those who have pioneered in this work and have been interested in studies of this character as they relate to the whole subject of constitutional type and disease, we decided to determine what connections existed between disturbances of body mechanics, more specifically posture, and common gynecologic symptoms. We believed that such a study would not only reveal the relationship, if any, between poor body mechanics and the more common gynecologic symptoms, but would also serve as a basis for later studies of constitutional types in relation to gynecologic disease.

After several years of preliminary adjustment, we finally (1927) commenced such a study. In order to eliminate disease factors which might have an important bearing on the individual's symptoms we used for subjects young and presumably healthy college women instead of gynecologic patients with their multiple ailments. The study involved consideration of other symptoms, but in this report we are concerned only with dysmenorrhea and its relationship to posture.

In an earlier report before this section we presented both the method of study and the findings for the first two years. In general the method consisted of elaborate questioning concerning the many aspects of dysmenorrhea and examination and qualitative classification of each individual as to type of posture and grade of muscle tone. A permanent record of this posture type was kept each year in the form of a silhouette photograph. The work of obtaining all these data and of qualitatively classifying each individual was done by persons trained in

this kind of research. Although changes in the working personnel occurred during the four year period, it is doubtful whether these changes can be considered to have a significant bearing on the data obtained. As in all studies of this character, the methods used are open to considerable criticism. These objections will continue to exist in work of this nature until more precise methods of study are developed. The check-up at the end of the fourth year was identical in all respects (except for working personnel) with the initial examination and questioning made in 1927. For further details about the method of study and recording of data the reader is referred to an earlier publication on this subject.*

Since data presented in earlier reports covered either a different or a larger group of young women, and were based on a shorter period of study, we may justly expect some variance in statistical information from that here presented which covers a consecutive four year study of 302 young college women.

The amount of data obtained from this study is somewhat bewildering. Indeed, we are none too confident that the findings have been properly and fully interpreted. The final tabulations have been a source of both surprise and disillusionment. When the preliminary report of 1928 was written, it forecast a vastly different picture than we are now able to present. At that time the relationship between faulty posture and dysmenorrhea appeared definite, and it was only with effort that a natural enthusiasm was suppressed. Today, the evidence is even more striking, but in an opposite direction. For we not only failed to substantiate what in earlier studies indicated a rather close association, but further, have created in our minds no small doubt concerning the correctness of our present-day ideas of desirable posture for women. More of this, however, at some other time.

Of the 302 women studied, 145 or 48 per cent complained of dysmenorrhea in 1927 at the opening of college when this study was begun. Though the incidence of dysmenorrhea varied during the intervening years, the surprising fact (to us) was that in 1931, at the end of the four year period, 145 or 48 per cent complained of dysmenorrhea (Table I). In other words the incidence of dysmenorrhea was the same before and after the four years of college life and its attendant instruction in physical education. Considering this group of 145 with dysmenorrhea in relation to posture type, we made the unexpected discovery that in 1927, 111 or 76 per cent of the women with dysmenorrhea had undesirable posture; that in 1931, four years later, 110 or 76 per cent of the women with dysmenorrhea demonstrated a desirable type of posture. A comparable increase in the desirable types of posture, at the end of the four year period was also noted in women without dysmenorrhea.

*Additional Light on the Problem of Dysmenorrhea. J. A. M. A. 95: 1796, 1930.

True, the incidence of dysmenorrhea was less at the end of the second year (1929) when there was also a noticeable increase in the desirable types of posture and a decrease in poorer types. It was at this time that a preliminary report was issued in which we stated that we believed this apparent "cause and effect relationship was more than incidental." The decrease in dysmenorrhea at the end of the second year (Table I, 1929*) and coincident improvement in posture would appear significant,

TABLE I

POSTURE AND DYSMENORRHEA

BASED ON A CONSECUTIVE FOUR YEAR STUDY OF 302 YOUNG COLLEGE WOMEN

POSTURE IN NON-DYSMENORRHEICS 1927						POSTURE IN DYSMENORRHEICS					
POSTURE						POSTURE					
	29%	6%	10	EXC.	4	3%	24%				
	23%	36	GOOD	30	21%						
	71%	55%	87	FAIR	82	57%	76%				
	16%	24	POOR	29	19%						
52% NON-DYSMENORRHEIC						157	145	48% DYSMENORRHEIC			

1928						1928					
POSTURE						POSTURE					
	46%	7%	9	EXC.	9	6%	44%				
	39%	60	GOOD	58	38%						
	54%	46%	70	FAIR	75	50%	56%				
	8%	12	POOR	9	6%						
50% NON-DYSMENORRHEIC						151	151	50% DYSMENORRHEIC			

1929						1929					
POSTURE						POSTURE					
	54%	4%	8	EXC.	1	1%	52%				
	50%	108	GOOD	46	51%						
	46%	92	FAIR	37	41%		48%				
	3%	6	POOR	6	7%						
70% NON-DYSMENORRHEIC						212	90	30% DYSMENORRHEIC			

1930						1930					
POSTURE						POSTURE					
	50%	7%	13	EXC.	4	3%	41%				
	43%	80	GOOD	43	38%						
	50%	45%	84	FAIR	58	50%	59%				
	5%	10	POOR	10	9%						
62% NON-DYSMENORRHEIC						187	115	38% DYSMENORRHEIC			

1931						1931					
POSTURE						POSTURE					
	77%	39%	62	EXC.	44	30%	76%				
	38%	59	GOOD	66	46%						
	23%	22%	34	FAIR	31	21%	24%				
	1%	2	POOR	4	3%						
52% NON-DYSMENORRHEIC						157	145	48% DYSMENORRHEIC			

in light of the fact that the dysmenorrhea increased during the last two years of college, during which time no prescribed physical training was required, were it not for the fact that a continuous improvement in posture was noted over the four year period (Table I). This improvement in posture was general, occurring in nondysmenorrheics and dysmenorrheics. If this improvement is real we must admit that the evidence presented is convincingly against the existence of any relationship whatsoever, between dysmenorrhea and posture. Whether this

*The first examination was made in the fall of 1927 on admission to college. The first check-up was in the spring of 1928 and the second year check-up in the spring of 1929.

improvement in posture was real or apparent, however, is debatable. Having learned the characteristics of good posture and knowing that it was considered desirable, the subjects may have assumed their best posture for the examinations in 1930 and 1931, though perhaps no real improvement had been achieved. Unfortunately this must remain an open question until more conclusive evidence is made available.

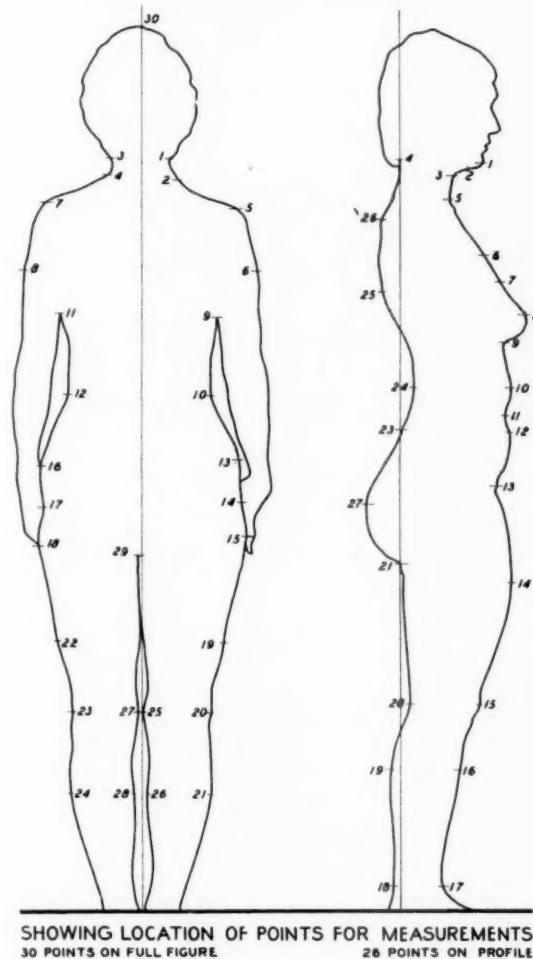


FIG. 1.

The 302 young women were divided into four groups as follows:

Group I. Dysmenorrhea in 1927 but none in 1931	46 or 15.2%
Group II. No dysmenorrhea in 1927 but dysmenorrhea in 1931	45 or 14.9%
Group III. No dysmenorrhea in 1927 and none in 1931	112 or 37.0%
Group IV. Dysmenorrhea in 1927 and also in 1931	99 or 32.7%

Seventy per cent (Groups III and IV) showed no change so far as dysmenorrhea was concerned. This includes the group with no dysmenorrhea in either 1927 or 1931. Posture improvement was general in all these groups (Table II).

It is of interest to note that the improvement was least pronounced in Group IV (those having dysmenorrhea in 1927 and 1931) and highest in the group (III) never having dysmenorrhea.

A comparison, based on constitutional type, was made of the two principal groups, III and IV. A pantographic enlargement of body

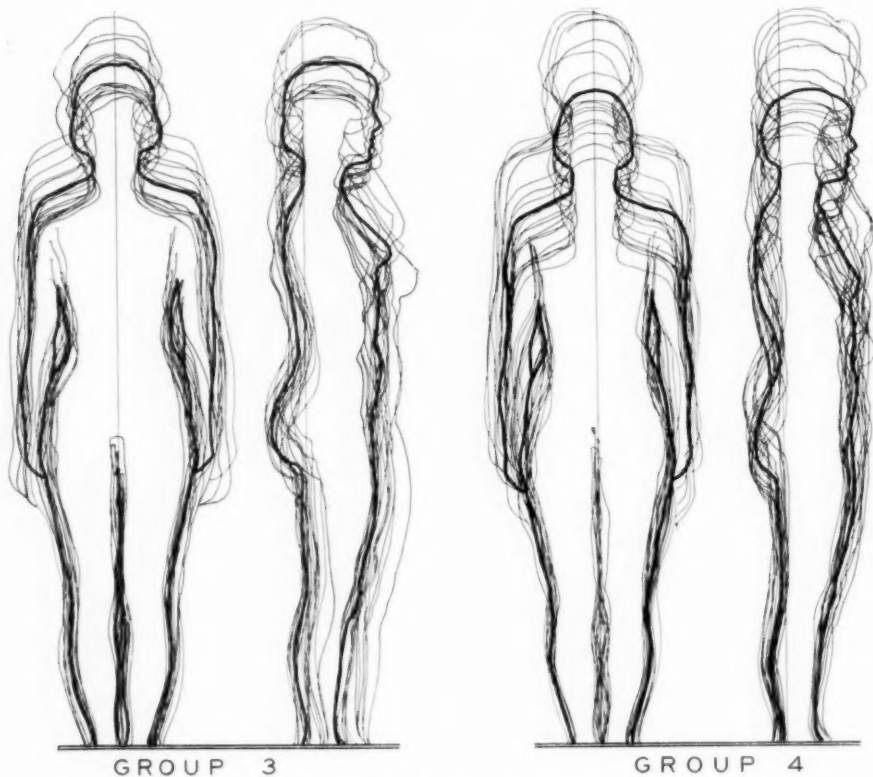


Fig. 2.

TABLE II. INDICATING POSTURE CHANGE IN EACH GROUP AT THE END OF THE FOUR YEAR PERIOD

GROUP	POSTURE					
	IMPROVED		SAME		WORSE	
	NUMBER	PER CENT	NUMBER	PER CENT	NUMBER	PER CENT
I						
Dysmenorrhea in 1927						
None in 1931	36	78.2%	9	19.5%	1	2.1%
II						
No dysmenorrhea in 1927						
Dysmenorrhea in 1931	34	75.5%	9	20.0%	2	4.4%
III						
No dysmenorrhea in 1927						
No dysmenorrhea in 1931	92	82.1%	13	11.6%	7	6.2%
IV						
Dysmenorrhea in 1927						
Dysmenorrhea in 1931	63	63.6%	24	24.2%	12	12.1%

outline or contour was made as carefully as possible from silhouette photographs of twenty individuals in each of these two groups. Measurements were also taken in order to permit establishment of a mathematical average for each group. To obtain an idea of the mathematical average type of posture representing each of the two groups 30 points were taken

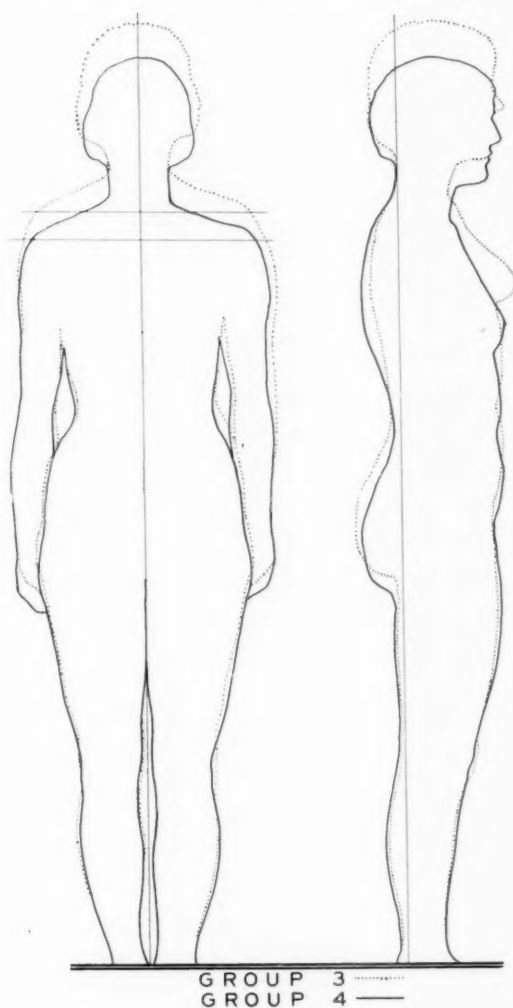


Fig. 3.

on the full figure and 26 on the side view (Fig. 1). These points were so taken as to give at least three points for each prominent part of the torso outline. Distances in tenths of an inch were measured on both X and Y ordinates for each point. In the full figure the vertical perpendicular passed through the crotch. In the side view the vertical perpendicular was dropped from the deepest point on the head-neck curve. The horizontal base line was drawn through the external malleoli

of the ankles and was the same for both figures. Superimposed pantographic enlargements for each group are shown in Fig. 2. The mathematical average for each group is also shown superimposed in the heavy line. A comparison of the average posture types for the two groups (i.e. Group III, those never having dysmenorrhea, and Group IV, those always having dysmenorrhea) is shown in Fig. 3.

It will be noted that there is some difference in height and in breast contour. The difference in stature would suggest that taller individuals are less prone to dysmenorrhea. The difference in breast contour may be of no significance, yet it suggests greater breast development. The thought of a relationship between breasts and dysmenorrhea may appear ridiculous; but, should further study prove mature breast development more common in women who do not have dysmenorrhea; the endocrine aspects of this relationship should prove interesting. No other noticeable difference was discovered in comparing the two groups.

MUSCLE TONUS AND DYSMENORRHEA

Ever since this study began it was our feeling that muscle tonus was far more important than posture; that posture was dependent on muscle tonus; that good posture meant good tone but that the reverse was not necessarily true. Throughout this study an effort was made to determine qualitatively and to record muscle tonus with the idea of determining what, if any, relationship existed between muscle tonus and dysmenorrhea. In this respect the study has been most disappointing; and, were it not for the fact that it has served to further emphasize muscle tonus and the need for precise measuring methods, we might also say valueless. Satisfactory grading of muscle tonus by the visual or impressionistic method is impossible. We firmly believe that, when we have arrived at a clear understanding of muscle tonus and have learned how it may be accurately measured, a revival of this study will prove of more than usual interest.

SUMMARY

A consecutive four year study of young college women for the purpose of determining what, if any, relationship exists between posture and common gynecologic symptoms was undertaken. This study was begun in 1927, and the collection of data completed in 1931. Though initial examination was made of 785 young women, it was found at the end of the four year period that there were complete consecutive four year records on only 302. Improvement in posture was demonstrated which occurred quite as consistently among those who had no dysmenorrhea at any time as it did among those with pain at each period. Whether this improvement was real or only apparent could not be positively determined. No unusual change was noted in the subjective or objective characteristics of the menstrual periods. So far as constitutional type

was concerned the average nondysmenorrheic woman was found to be slightly taller and to have more pronounced breast development.

CONCLUSIONS

Since we cannot be positive concerning the actual improvement in posture, any conclusions drawn from this study must be qualified. If the improvement in posture noted in this study is real, then we may conclude that:

1. There exists no cause and effect relationship between poor posture (based on present-day standards of posture) and dysmenorrhea.
2. The presence of desirable posture is no indication that the individual is less likely to be afflicted with dysmenorrhea.
3. The attainment of desirable posture carries with it no assurance that an existing dysmenorrhea will be relieved.
4. So far as the single symptom, menstrual discomfort, is concerned there is nothing to indicate that good posture (based on present-day standards) is any more desirable than poor posture (also based on present-day standards).
5. The average woman who does not have dysmenorrhea is slightly taller and appears to have greater breast development than the average woman with dysmenorrhea.

X-RAY CEPHALOMETRY

A METHOD FOR THE MEASUREMENT OF THE ENGAGED HEAD

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RENEWED interest has recently been manifested in x-ray cephalometry. The newer as well as the older methods are, however, applicable only to the movable or floating head. No procedure has thus far been devised for the accurate measurement of the engaged head. Yet there is often an urgent need for determining the size of the head, even after it has reached the ischial spines, since engagement does not necessarily exclude disproportion, particularly in funnel pelves. The present method was therefore devised for the roentgenographic measurement of the engaged head.

In determining the size of the engaged head the measurements must be limited to the vertex, since the shadow of the occipitofrontal diameter is subject to distortion due to the inclination of the head along the pelvic axis, and to the variable anterior or posterior rotation of the occiput.

The diameter of the vertex to be measured on the x-ray film is represented by the greatest transverse dimension nearest to the occiput or lower pole of the head (Fig. 1). Due to the inclined and oblique

position of the engaged head, this is neither the commonly known biparietal, nor the suboccipitobregmatic diameter, but an intermediate diameter which passes diagonally from a point in the posteroinferior quadrant of one parietal bone, to a diametrically opposite point in the anterosuperior quadrant of the other parietal bone. Both its anteroposterior, and its lateral obliquity may vary considerably, depending on the degree of rotation, flexion, or inclination of the head along the pelvic axis. This diameter will be referred to as the oblique biparietal diameter. It is the only diameter of the engaged head which is available for measurement on the x-ray film.

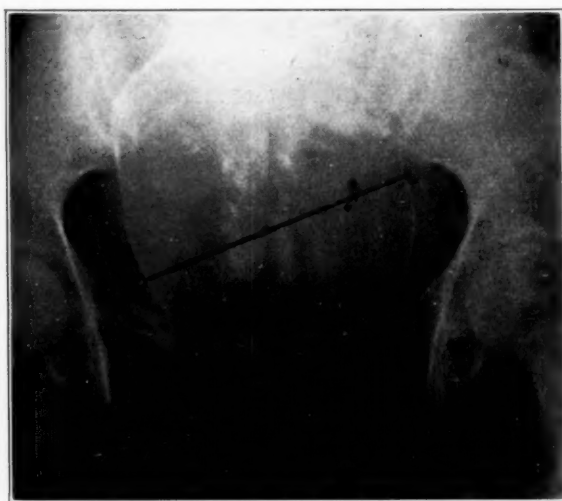


Fig. 1.—Film taken at beginning of second stage of labor. Solid line represents the oblique biparietal diameter; broken line the level of the spines. Magnified oblique biparietal diameter measures 11.3 cm. Distance of occiput past spines is 1.6. $\times \frac{1}{3}$

The following conditions must be fulfilled for the roentgenographic measurement of the oblique biparietal diameter:

First, the dimension of the shadow cast by the diameter under consideration, must not be subject to change with ordinary variations in rotation, flexion, or inclination of the head.

Second, the diameter must be at a measurable distance from the sensitive film, so that a correct reduction can be made for its magnification. This requirement can be satisfied provided the diameter in question is at a measurable distance above a definite landmark, such as the ischial spines; and provided also, that this landmark is in turn at a measurable distance above the sensitive film (Fig. 2).

The following evidence is presented to show that these requirements can be satisfied.

THE CONSTANCY OF THE SHADOW OF THE OBLIQUE BIPARIETAL DIAMETER

Since the oblique biparietal diameter may pass through divergent points of the vertex, it is necessary to ascertain whether or not its

dimension is subject to change with ordinary variations in its obliquity. To determine this, head measurements were taken in a series of 121 infants three to six days after birth. The measurements of the vertex were taken from widely separated points on one parietal bone, to diametrically opposite points on the other parietal bone. The various measurements of the oblique biparietal diameter thus obtained, agreed within 0.4 cm., in 97 per cent of the cases.

From the above data it may be concluded that the dimension of the oblique biparietal diameter is practically constant, regardless of considerable variations in the degree of its obliquity. It follows, therefore, that its shadow cannot be subject to appreciable change with ordinary variations in the position of the head, since such variations would merely result in the substitution of one oblique diameter for another, of a different inclination, but approximately of the same

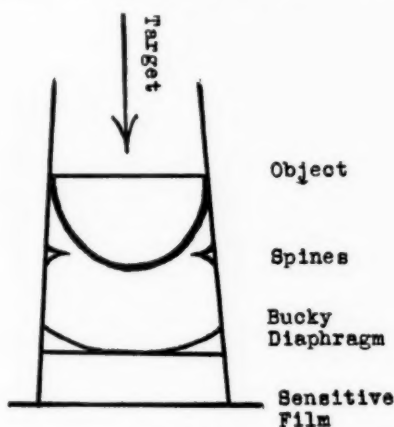


Fig. 2.

Fig. 2.—Shows distances involved between the oblique biparietal diameter and the film. Target-film distance 75 cm.; oblique biparietal diameter to spines 4.5 cm.; spines to Bucky diaphragm 6.0 cm.; diaphragm to film 3.0 cm. Object-film distance 13.5 cm. (4.5 + 6.0 + 3). $\times \frac{1}{4}$.

Fig. 3.—Course of pelvic axis. Upper limb of axis is inclined 60° , lower limb is approximately horizontal in its first half. Course of horizontal part is vertically about 1 cm. above level of spines. $\times \frac{1}{4}$. (Redrawn from Williams' Obstetrics, D. Appleton & Co.)

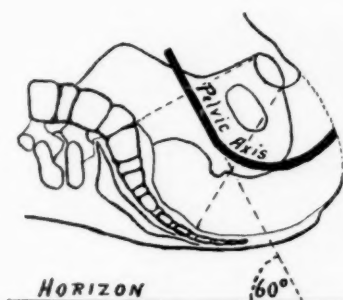


Fig. 3.

dimension. In the last analysis, the constancy of the shadow of the oblique biparietal diameter rests on the fact that the vertex is almost a perfect hemisphere, and that the shadow cast by a spherical object remains constant regardless of the direction in which such an object may be rotated on its axis.

THE PERPENDICULAR DISTANCE OF THE OBLIQUE BIPARIETAL DIAMETER FROM THE ISCHIAL SPINES

In estimating the distance of the oblique biparietal diameter from the ischial spines, it is to be understood that the distance of this diameter from the occiput is about 5 cm.; this is due to the fact that the vertex is hemispherical, and that its diameter is approximately 10 cm.

If, however, greater accuracy is desired, the distance can be measured vaginally by means of an ordinary external pelvimeter such as Breisky's. This can be done by introducing one arm of the instrument into the vagina, and steadying its point against the ischial spine, while the point of the other arm is brought up under or against the edge of the examining table. The patient is instructed to relax and to lie flat on the table while the reading is taken. Three centimeters is added to the reading obtained for the thickness of the ordinary Potter-Bucky diaphragm. The resulting value represents the total distance of the ischial spines from the sensitive film (Fig. 2).

If a vaginal examination is contraindicated the measurement can be taken rectally by means of a simple pelvimeter devised for this purpose. The instrument is similar to an external pelvimeter, with the exceptions that its arms have but a slight curvature, and that one arm carries a ring attached to the inner surface of its free end (Fig.

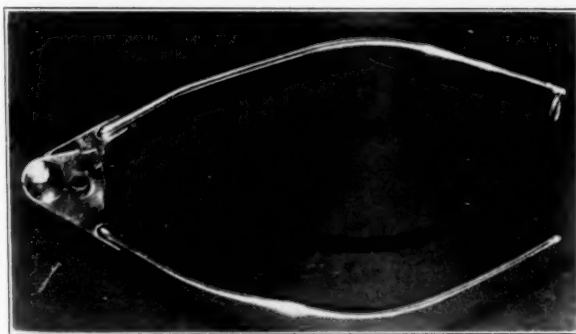


Fig. 5.—Pelvimeter for measuring, rectally or vaginally, distance of spines from examining table. Upper arm carries ring to fit tip of index finger. $\times\frac{1}{4}$.

5). To obtain the measurement, the arm of the instrument carrying the ring is introduced into the rectum by means of the tip of the index finger placed within the ring. The ring is steadied against the tip of the ischial spine while the point of the other arm is brought up under or against the edge of the table. The reading is taken as in the vaginal measurement.

CALCULATION OF RESULTS

The oblique biparietal diameter is measured on the x-ray film (Fig. 1). The object-film distance (the distance between the oblique biparietal diameter and the sensitive film) is obtained by adding the distance between the object and the spines to the distance between the spines and the sensitive film (Fig. 2). The true dimension of the oblique biparietal diameter can now be readily derived, since the ratio of this diameter to its shadow is the same as the ratio of the target-object distance to the target-film distance.

For example (Fig. 2), if the shadow of the oblique biparietal diameter measures 11.3 cm., the target-film distance 75 cm., and the object-film distance 13.5 cm., then the value of the oblique biparietal diameter equals:

$$\frac{61.5}{75} \times 11.3 \text{ cm.} = 9.3 \text{ cm.}$$

A correction should be made for the thickness of the scalp by adding an estimated value of 0.1 cm. to the result obtained (9.3 + 0.1).

SERIES OF MEASUREMENTS TAKEN

Measurements of the oblique biparietal diameter were taken by the method described in a series of 31 consecutive cases.

The films were taken between pains, when the first stage of labor was well advanced, but before the development of excessive moulding or overlapping of sutures. Exposures were made according to the following technic:

Distance	75 cm.
Kilovolts	79-85
Milliamperes	10
Time	10-15 seconds

For purposes of control, direct measurements of the oblique biparietal diameter were taken in each case on the fourth or fifth day postpartum. It was assumed that at this stage of the postnatal period the residual moulding is approximately of the same degree, and is comparable with, the initial moulding which is present during the active first stage of labor when the x-ray films are taken. Proof for the validity of this assumption is, of course, lacking; but since the moulding in the cases under consideration is slight, the possible error may be considered negligible.

The maximum difference between the direct and the x-ray measurements of the oblique biparietal diameter was 0.4 cm., and in 24 of the cases (77.4 per cent) the discrepancy was not greater than 0.2 cm. The averages for the two series of measurements is practically identical. The method may therefore be considered reliable and sufficiently accurate for practical purposes.

SUMMARY

A method is presented for the roentgenographic measurement of the engaged head. The part of the head measured is the magnified shadow of the (oblique) biparietal diameter. The necessary data for reducing the magnification of the shadow are obtained by determining the height of the object above the sensitive film. This is accomplished by measuring the distance of the object from the ischial spines and the distance of the spines from the sensitive film.

In 31 controlled measurements the maximum error was 0.4 cm. In 77.4 per cent of these cases the error was not greater than 0.2 cm.

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1009 MEDICO-DENTAL BUILDING

THE RELATIONSHIP BETWEEN THE EARLY AND LATE TOXEMIAS OF PREGNANCY*

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IN ORDER to establish whether there is any relationship of clinical significance between the toxemias of early and late pregnancy, a careful study has been conducted in one of the prenatal clinics at the Kensington Hospital for Women, of 272 patients who were registered and later delivered during the twenty-month period, beginning Jan. 1, 1932, and ending Sept. 1, 1933. Included in the series are 127 primiparas and 145 multiparas. The ages ranged from fifteen years to thirty-five years, and with two exceptions all were white patients.

The stimulus to make such a study was furnished by the differences of opinion expressed by men of wide experience in the field of obstetrics on this question of relationship. Some held that the development of toxic manifestations in the first trimester in no way prognosticated trouble in the last three months of pregnancy. Others contended that experience had taught them that a toxemia of greater or lesser concern developing in the last trimester was to be expected if there was a history of a toxic first three months.

All of the patients studied were personally interviewed by the author on each visit to the prenatal clinic. The majority registered some time during the first half of pregnancy, and at the first visit were questioned very carefully for any symptoms of toxemia occurring during the first three months. In addition the patient's weight just before pregnancy, either known or estimated by her, was noted. On each subsequent visit the careful search for toxic symptoms was continued, emphasis being placed on the complaints made during the last three months. Blood pressure readings were made at each visit and the patient's weight on her last visit to the clinic before the onset of labor was taken as her final weight, assuming, of course, that all these patients were regular in their attendance.

The primiparas and multiparas have been grouped separately. Both of these groups have been divided into four classifications or schedules

*Read at meeting of the Obstetrical Society of Philadelphia, October 5, 1933.

and each of these in turn subdivided into four groups. The classifications have been made on the following basis:

Schedule A: Patients entirely symptom-free during the first trimester.

Schedule B: Women having physiologic morning nausea and vomiting.

Schedule C: Patients mildly pathologic, as evidenced by nausea and vomiting repeated several times during the day.

Schedule D: Patients markedly pathologic in the first trimester and requiring hospitalization.

Each schedule is subdivided into four groups:

Group I: Patients considered negative in the last trimester.

Group II: Patients whose only toxic manifestation was a blood pressure elevation, 130 systolic and 90 diastolic being the levels of significant elevations.

Group III: Patients with two or more toxic symptoms or signs but no blood pressure elevation. Headaches, blurring of vision, epigastric distress, nausea and vomiting, edema, insomnia and neuritis were the principal manifestations.

Group IV: Patients with both a blood pressure elevation and toxic symptoms and signs.

Under each grouping in each classification the average weight gain of the mothers during the entire pregnancy and the average weight of the babies born to these mothers are included.

PRIMIPARAS

Thirty-eight per cent of the primiparas were symptom-free in the first trimester, while 62 per cent manifested some degree of toxemia, varying in severity from physiologic nausea and vomiting to hyperemesis gravidarum.

In the series of 48 cases representing the 38 per cent who were negative in the first trimester, 75 per cent had uneventful third trimesters, while 25 per cent had definite evidences of late toxemia.

In the series of 69 cases representing 54 per cent of the primiparas studied, who were physiologically toxic in the first trimester, 49 per cent were negative in the last trimester, while 51 per cent were regarded as toxic. In the toxic mothers at term the average weight was slightly above that in the nontoxic mothers. But the average infant weight was definitely lower than the infant average in healthy mothers.

The mildly pathologic toxemias of early pregnancy numbered 7 or 5.5 per cent of the total. Forty-three per cent were negative in the last trimester, while 57 per cent were toxic.

In 3 cases of hyperemesis gravidarum, there were no evidences of toxemia developing in the last trimester. It should be noted that the average weight gain for the 3 mothers was 10 pounds, no doubt due to a considerable weight loss during the stormy first trimester. The baby weight average for these women was 7 pounds 7 ounces.

MULTIPARAS

Forty per cent of the multiparas were symptomless in the first trimester of their pregnancies, while 60 per cent experienced pathologic first trimesters from the standpoint of toxic manifestations.

In the series of 58 cases representing the 40 per cent who were negative in the first trimester, 70.6 per cent had uneventful third trimesters. The remaining 29.4 per cent were found to present definite evidence of toxemia in the last trimester.

There were 68 cases, or 46.2 per cent of all the multiparas studied, with physiologic morning nausea and vomiting. Of this group 58.5 per cent of the patients were without complications in the last trimester, while 41.5 per cent of the patients demonstrated signs of late toxemia.

Sixteen cases, or 11 per cent, were mildly pathologic in the first trimester, with frequent attacks of nausea and vomiting. Despite the hectic first trimester experienced by this group, 43.7 per cent were non-toxic in the last trimester. The remaining 56.4 per cent of this series became toxic in the last trimester.

Three multiparas, or 2 per cent of the total, developed hyperemesis gravidarum in the first trimester. However, all 3 went through the remainder of their pregnancy without the slightest evidence of a late toxemia. The loss in weight experienced in the first trimester by these mothers was barely regained during the following six months. The average maternal weight gain in this series was 2 pounds. This did not influence the ultimate weight average of the babies, which was 7 pounds 2 ounces.

CONCLUSIONS

1. The incidence of toxemia in early pregnancy is comparatively the same for both primiparas and multiparas. In our series, 62 per cent of the primiparas and 60 per cent of the multiparas were toxic in the first trimester.

2. In primiparas with negative first trimesters, 25 per cent have toxic third trimesters. The margin of safety is slightly lower in multiparas, 29.4 per cent being toxic in the last trimester. No conclusion can be reached on the character of the late toxemia these positive cases are likely to experience, since the percentages are well distributed among the three possibilities, namely, (1) on elevated blood pressure alone; (2) toxic symptoms alone; and (3) toxic symptoms and elevated blood pressure combined.

3. The incidence of late toxemia is definitely increased in cases presenting the physiologic nausea and vomiting of the first trimester, 41 per cent of multiparas and 51 per cent of primiparas experiencing this form of early toxemia were toxic in the last trimester. Here again the types of toxic manifestations in the last trimesters are fairly evenly distributed.

4. The most pronounced increase in the incidence of late toxemia occurring in patients who are toxic in the first trimester is found in those patients who present the moderately severe type of vomiting during the first three months. The incidence was 57 per cent in primiparas and 56.4 per cent in multiparas.

5. It is apparent from these rather convincing statistics that a patient who has experienced a toxic first trimester must be watched for evidences of toxemia occurring the last trimester. It is suggested that the likelihood of a late toxemia, making its appearance, is in direct proportion to the severity of the early manifestations.

6. Based on our observations thus far, it is difficult to explain the freedom the 6 patients with hyperemesis gravidarum enjoyed during the last three months of their pregnancy.

7. Except in those patients who lose weight excessively as a result of a severely taxing first trimester as seen in the pathologic type, and who spend the remaining six months of their pregnancy regaining their weight loss, there is nothing remarkable about the comparative weight values in these patients. The moderately toxic patients show us an average weight gain between normal limits. In no instance was the weight gain excessive. The babies' birth weight average remained fairly constant within normal limits. Babies normal in size and weight were born to women whose health was seriously impaired in early pregnancy and whose average weight gain was greatly below normal.

8. The middle trimester of pregnancy seems to be comparatively free from toxic manifestation. Women who have suffered acutely from the nausea and vomiting of the early months, and even those who later develop the toxemia of late pregnancy, seem to enjoy this period of freedom from illness during the middle months.

9. We feel that possibly the more frequent development of the late toxemia in those patients who have had trouble in the early months, may be simply an extension of a more pronounced reaction to a lowered resistance engendered by the early toxemia.

ROUTINE INDUCTION OF LABOR AT TERM*

SAMUEL M. STERN, M.D., PHILADELPHIA, PA.

INDUCTION of labor, because of the hazards and difficulties associated with the accepted methods of procedure, has generally been reserved for various emergencies or for cases otherwise incapable of normal delivery. The high incidence of fetal mortality and maternal morbidity made the procedure unavailable as an elective measure. Furthermore, the operation often necessitated frequent internal examinations and manipulations, sometimes extending over days, making it distasteful and generally unacceptable from the patient's viewpoint. Medical inductions on the other hand, while safe and easily executed were unreliable, often failing after four or five attempts. It became apparent, therefore, that before routine induction of labor could become a possibility, a new method of induction had to be devised, a method that would at once induce labor positively, quickly, and without added danger to mother or child.

Our interest in this work was stimulated by the recent appearance of Slemmon's paper on the induction of labor at term by the method of rupturing the membranes, and the intranasal application of pituitary extract, following a preliminary administration of quinine and castor oil. He was able to induce labor in his entire series of 132 cases. Furthermore, the interval between rupture of the membranes and the onset of labor, was found to be definite and short in all but two cases. Again, labor was not prolonged as might be expected, but on the contrary was considerably shortened. Thus his multiparas averaged two to five hours in labor, and primiparas four to eight hours.

Guttmacher and Douglas, reporting from the Hopkins Clinic on 120 inductions by this method, made similar observations. Comparing their results with an analysis of induction of labor by the bougie and the bag, previously made by Morton, they found the rupture of membranes 100 per cent successful in inducing labor, the bag successful in 93 per cent, and the bougie in 82 per cent. Fetal mortality in this study was found to be approximately 6 per cent in the group induced by rupture of the membranes, 18 per cent in the bougie group, and 47 per cent when the bag was used. Similarly, maternal morbidity showed an incidence of 13 per cent in the group induced by rupture of the membranes, as compared to 18 per cent for the bougie and 37 per cent for the bag.

Moreover, it was further demonstrated that the rupture of membranes early in labor or at term was not the calamity it was generally considered to be, but on the contrary actually resulted in shortening labor as similarly reported by Slemmons. The average primipara in this series, for

*Read at meeting of the Obstetrical Society of Philadelphia, October 5, 1933.

instance, was in labor ten hours, as compared to eighteen hours, the time given by Williams as the average duration of labor in all primiparas, based on an analysis of 14,396 consecutive deliveries at Johns Hopkins. Multiparas averaged six hours in this series as compared to twelve hours, the average for all multiparas as given by Williams. Maternal morbidity was, likewise, surprisingly low, showing an incidence of only 10 per cent as compared to 20 per cent, the general incidence of morbidity at the Hopkins Clinic from 1923 to 1928. Fetal mortality was unaffected, being 5 per cent in both series.

In view of these findings, which appeared to run counter to most of our own ideas concerning dry labors, we determined to undertake a series of inductions, utilizing the technic described by Slemmons. In order to obtain as many cases as quickly as possible, and since previous reports indicated that "this technic decreased the average length of labor, lessened the incidence of puerperal infection, and did not affect fetal mortality," we decided to induce labor at term routinely on all patients who would submit to it.

Accordingly the patient was advised to come to the hospital on the day due or a few days before this date. On admission she received two ounces of castor oil and 10 gr. of quinine sulphate. Two hours later a hot soapsuds enema, and one or two hours later taken to the delivery room and prepared as for delivery. A careful vaginal examination was made at this time, after which and without withdrawing the examining fingers, Wilson's amniotic trocar, an instrument especially devised for rupturing membranes, was inserted into the vagina and guided into the cervical canal. The cervix at term will practically always admit one finger and sometimes two fingers. If forewaters were present the membranes were easily pierced with the trocar. When the membranes were closely applied to the head, it was necessary to raise the head a trifle, and by getting the patient to bear down a little at the same time, it was always possible to develop a small pouch of forewaters. The whole procedure is a simple one, and except where unusual difficulties are encountered, takes little longer to carry out than a thorough vaginal examination. Anesthesia is rarely required. It was used in only one of our patients, a very obese and nervous patient with a deep vagina to whom even a simple vaginal examination was an ordeal. Occasionally a long cervix is encountered which will not admit one finger at the internal os and anesthesia may be necessary to dilate it. It is now our practice not to advise induction of labor as an elective measure in these cases. The vast majority of patients, however, offer no such difficulties.

Following the rupture of membranes, a pledget of cotton saturated with an ampule of pituitrin is immediately inserted into one nostril. If tetanic contractions of the uterus should develop, it is withdrawn at once. Otherwise it is allowed to remain for half an hour. At the end of an hour, if labor has not started, another pledget of cotton saturated with pituitrin is inserted into the other nostril. The average interval between the rupture of membranes and the onset of labor is one hour for multiparas and four hours for primiparas.

Our series to date consists of 85 cases. Of these 33 were primiparas and 52 multiparas. Labor was successfully induced in all cases.

Length of Labor.—Primiparas averaged twelve and five-tenths hours from the time of rupturing membranes. As labor did not begin in these patients for four hours

on an average, after rupture of membranes, the duration of actual labor was eight and one-half hours. Comparing this with Williams' figure of eighteen hours as the average for primiparas, we note a striking reduction in the duration of labor. Our multiparas averaged six hours in actual labor or seven hours from the time of rupturing membranes. Comparing this again with Williams' figure of twelve hours as the average for multiparas, we note a similar reduction in the duration of labor for multiparas. Individually our cases showed considerable variance as to length of labor. Thus, our shortest case required only one and one-half hours, our longest case forty-one hours. Four of our patients were in labor more than twenty-four hours, approximately 6 per cent of our cases. In this connection it is interesting to note that in 1915, Slemons, investigating 500 consecutive labors, and noted that 12 per cent required over twenty-four hours.

Morbidity.—Does induction of labor by rupturing membranes result in an increased maternal morbidity as might be expected? Eight of our cases were classified as morbid, an incidence of 9.4 per cent. This compares very favorably with the average incidence of morbidity in hospitals generally. Furthermore on analyzing these cases, we find that in two instances, mastitis was the responsible factor, a bad cold in one and eclampsia in one. The remaining 4 cases could not be definitely classified.

Fetal Mortality.—There were 3 stillbirths, an incidence of 3.5 per cent. The first occurred in a primipara who had a very easy labor of approximately two and one-half hours, a spontaneous L.O.A. Baby was cyanotic, weighed 5 pounds 10 ounces, breathed satisfactorily at birth and showed no signs of injury or pressure, other than slight molding and a slight caput. Baby died on the second day. Autopsy was refused.

The second fetal death occurred in a multipara, following precipitate labor. This patient gave a history of precipitate labors in her past pregnancies; nevertheless we feel that these patients should not be subjected to elective inductions. Autopsy revealed intracranial hemorrhage as cause of death.

The third fetal death occurred in a primipara. After five hours in labor with the head on the perineum, the patient was delivered by outlet forceps and episiotomy. The child could not be resuscitated. There were no signs externally of injury or excessive pressure. Unfortunately, autopsy was refused.

Mode of Delivery.—Delivery was effected as follows:

Spontaneous deliveries	59 cases
Low forceps	19 cases
Midforceps	5 cases
Breech extractions	2 cases
Total	85 cases

It would hardly be fitting to conclude this report without a few words on dry labor so-called. DeLee states that "dry labors are usually long, tedious, and painful. Operative interference is oftener necessary in dry labors." Whether these lines appearing in a standard textbook on obstetrics can be held accountable for the widespread fear of dry labor, seems not unlikely. Certain it is, however, that all the studies on dry labor to date, based on a careful analysis of actual findings in these cases, does not bear out this statement. On the contrary the exact opposite is shown to be true. Thus, Mason, analyzing 166 cases of dry labor, occurring in 1,000 consecutive deliveries at the University of Colorado School of Medicine, observed that "labors lasting over twenty-four hours

occurred five times more frequently in those cases in which the membranes remained intact than in the cases in which early premature rupture occurred."

In an analysis of 600 cases of dry labor occurring in a series of 6,500 consecutive deliveries at the University of California, Schulze drew similar conclusions.

In conclusion, we feel that the routine induction of labor at term by the method described, while admittedly a radical innovation, is justified on the following grounds:

1. Length of labor shortened by approximately 50 per cent.
2. Lessened incidence of maternal morbidity.
3. Lessened incidence of fetal mortality.
4. The elimination of uncertainty regarding the date of confinement with the attendant disadvantages to both patient and physician.

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DISCUSSION

DR. PHILIP F. WILLIAMS.—Whether we induce labor for necessity or for convenience, there can be no doubt that the effective method which Dr. Stern has described must come into a considerable amount of popularity in the next few years.

Intrauterine manipulation is, of course, associated with the idea of infection. But the women induced in this series had no infection. There is always the danger, in the induction of labor by the introduction of the bag, that the head may be displaced and prolapse of the cord follow. This happened in none of our cases.

DR. DANIEL LONGAKER.—I recall distinctly the dogmatic declaration of the late J. O. Polak that an induced labor is always an abnormal labor and for that reason is not to be recommended. It is worth while to emphasize the fact that labor induced by this method is an extremely easy labor. The plan is highly efficient, uniformly successful and the results good.

DR. E. A. SCHUMANN.—When Dr. Stern proposed a trial of routine induction of labor by rupture of the membranes, etc., I was entirely opposed to it, holding that induced labor was pathologic labor, that errors in presentation would occur, that there would be an aggravation of the usual injuries to the birth canal, that infection would follow in a definite number of the cases, and that the fetal mortality would be increased. I still believe all these things to be true, but it must be admitted that none of them have happened. I am still waiting for the worst, but as month succeeds month with the smooth recovery of patients, I am impressed with the excellence of the procedure.

DR. STERN (closing).—At the Hospital clinic there has not been found any increase either in frequency or degree of lacerations.

Regarding Dr. Foulkrod's question, we admit that we have restricted this method to normal cases. We are not convinced, however, that our success depended chiefly on the patients being at term. We have been able to induce labor at six and seven months for toxemia, just as readily. We have, likewise, had similar success in inducing labor three or four weeks before term for moderate disproportion.

DÖDERLEIN BACILLUS. CULTURAL AND SEROLOGIC STUDIES*

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IN 1892 Döderlein¹ announced the existence of a gram-positive bacillus in the vaginal tract of normal pregnant women, which he believed to be a natural inhabitant and considered beneficial to the host.

Although a considerable amount of work has been done in the study of the Döderlein bacillus, on the prevalence, isolation, cultivation on the various media, etc.; the question as to its classification still remains an open one, and it has not as yet found a place in Bergey's Manual.

In some of the most recent papers attempts have been made to classify it with *L. acidophilus*. Lucy M. Bryce² in a study of 119 cases of pregnant women, found what she called Döderlein bacillus in smears of 84 cases; however, it was cultured in only 62 cases. Using ten strains in her studies with carbohydrates, she states "the observed characteristics agree with those of the genus *Lactobacillus* as described in Bergey's Manual." However, the strains varied in their carbohydrate fermentation and in conclusion she states that "*L. acidophilus* is a frequent inhabitant of the intestinal tract, therefore, it is easily conceivable that during infancy or childhood, organisms of this type may gain entrance to the vagina which is sterile at birth and finding there a particularly suitable environment establish themselves as the predominating species."

Thomas³ made comparative studies of Döderlein bacillus with *L. acidophilus* and *L. bulgaricus*. In his study, eight strains of Döderlein bacillus isolated from normal children six to twelve years of age were used with two control strains of each of *L. acidophilus* and *L. bulgaricus*. In most cases isolations were made from anaerobic plates and in one case from an aerobic plate.

The fermentation reactions reported were irregular, and there was no clear-cut difference between Döderlein, *Acidophilus* and *Bulgaricus* strains.

In his agglutination tests none of the sera prepared from Döderlein strains agglutinated *L. bulgaricus* antigen, 6 out of 8 agglutinated the *acidophilus* antigen, however the Döderlein sera agglutinated only one to five of the heterologous Döderlein antigens.

Thomas re-isolated every strain of Döderlein from the feces of human beings, after feeding them with the culture in milk, and draws the conclusion that Döderlein's vaginal bacillus is *L. acidophilus* and that this organism is present in less than 10 per cent of normal children.

It gets into the vagina by exterior passage from the intestinal tract, and can be introduced into the vagina by feeding a culture by mouth.

Lash and Kaplan⁴ studied the vaginal secretions in 98 pregnant women and found Döderlein's bacillus in smears in 41 cases but cultivated it in only 13 cases, using both aerobic and anaerobic methods.

They believe their failure to cultivate the organism in a great number of cases was due to more rapid growth of the associated organisms such as staphylococci, diphtheroids, streptococci, and *B. coli* which they also found present.

*Read at the meeting of the Eastern Pennsylvania Chapter Society of American Bacteriologists, Philadelphia, Pa. May 24, 1932.

They were unable to classify Döderlein bacillus by the carbohydrate fermentations, agglutination, precipitation, and complement fixation tests. They also injected animals using large doses of forty-eight-hour dextrose broth cultures, and found none of their Döderlein strains pathogenic for rabbits, guinea pigs, and mice. In their opinion the term "Döderlein bacillus" includes a large group of organisms which, though related have some differentiating characteristics. This fact makes it difficult to classify them and they suggest a specific name, "Lactobacillus vaginae," to a member of this group which differed in some characteristics from the other strains. We agree with Thomas³ that this would be unjustifiable due to lack of any definite criterion for classification.

Mohler and Brown⁵ in a recent paper deal with the question of "Döderlein's bacillus in the treatment of vaginitis."

Our present studies of the Döderlein bacillus have been made possible through the courtesy and interest of Dr. Roy W. Mohler, Associate in Gynecology at Jefferson Hospital, who obtained the cultures from cases in his practice.

We have two strains of Döderlein bacillus under study at the present time designated as Strains M1 and M2. Strain M1 was isolated from a normal virginal vagina on aerobic whey agar plates. It is a nonmotile gram-positive bacillus. It appears singly and also in short and long chains. Either straight or curved rods can be seen, with flat or rounded ends. Its average size is 0.5 to 1.0 μ wide and 3.0 to 5.0 μ long; however, some very short and very long forms can be seen depending on the age of the culture and its environment. Optimum temperature was 37° C.

When first isolated, the organism grew very poorly in whey and on whey agar plates and had to be transplanted daily for two weeks to acclimate it to its new environment. Once established it grows luxuriantly in whey, having a P_H 7.6. For all routine work cultures are carried in this medium. Stock cultures were kept in milk on account of its buffer qualities which are essential for the maintenance of cultures of the aciduric group.

Surface Colony on Whey Agar.—Small filamentous, irregular, slightly iridescent, fimbriate.

Deep Colony.—Resembles a very tiny pledget of cotton or the so-called Type X colony.

In Milk.—Coagulation in five days, soft coagulum, no gas.

Litmus Milk.—Turned acid in three days, coagulated in five days, no gas, soft coagulum.

Gelatin.—No noticeable growth at 20° or 37° C., under observation for ten days.

Dextrose Broth in Fermentation Tube.—Grew very poorly, and settled at the bottom in a precipitous sediment, no gas.

Indol.—Not formed.

Reduction of Nitrates.—Nitrates reduced to nitrites.

Strain M2 was obtained from a married woman in whom the vaginal tract appeared normal. It corresponds in all respects to Strain M1 except for the fact that it grows much more slowly, in milk and whey.

In the third culture from a normal case showing what appeared to be Döderlein's bacillus on the first plate, we failed to grow it in subsequent transplants.

In the fermentation tests we selected only those carbohydrates which gave the most consistent results, as reported by Lash and Kaplan, Bryce and Thomas.

For controls we used three known strains of *L. acidophilus*, one being our own and the other two obtained on the market from well-known acidophilus preparations. Hiss serum-water medium containing azolitmin and 1 per cent of carbohydrate, was used.

The cultures were grown in whey for eighteen hours, centrifuged, the acid supernatant discarded and sterile salt solution added to the organisms to make a heavy suspension; two to three drops of this suspension were added to each carbohydrate tube containing 1 c.c. of medium and incubated at 37° C.

No acidifying of medium occurred before the seventh day and on the tenth day there was a complete decoloration and in most instances coagulation, but no gas.

TABLE I. CARBOHYDRATE REACTIONS

STRAIN	MAL-TOSE	GLU-COSE	SU-CROSE	LAC-TOSE	RAF-FINOSE	MAN-NITE	SALICIN	INULIN
Döderlein M1	AC*	AC	AC	AC	AC	O	AC	O
Döderlein M2	AC	AC	AC	AC	AC	O	O	O
Acidophilus U	AC	AC	AC	AC	SA	O	AC	O
Acidophilus L	AC	AC	AC	AC	SA	O	A	O
Acidophilus S	AC	AC	AC	AC	AC	O	AC	O

*AC, acid and coagulation; A, acid; SA, slightly acid; O, no change.

Agglutinating sera were prepared from all the strains used. The Döderlein strains did not agglutinate each other nor any of the acidophilus strains. None of the acidophilus sera agglutinated the Döderlein antigens. Two strains of acidophilus isolated from milk showed cross agglutination. These results of the agglutination tests were checked by absorption experiments.

TABLE II. AGGLUTINATION REACTIONS

ANTIGENS

ANTISERA	DÖDERLEIN M1	DÖDERLEIN M2	ACIDOPHILUS U	ACIDOPHILUS L	ACIDOPHILUS S
Döderlein M1	+	0	0	0	0
Döderlein M2	0	+	0	0	0
Acidophilus U	0	0	+	0	0
Acidophilus L	0	0	0	+	+
Acidophilus S	0	0	0	+	+

*0 = negative, + = positive (agglutination).

The two strains of Döderlein bacilli absorbed the agglutinins from the homologous but not the heterologous serum. Of the three strains of acidophilus which were tested, each one absorbed its homologous agglutinin. Strain U did not absorb the heterologous agglutinins, however, Strains L and S absorbed the agglutinins produced by each other but not of U strain or the two strains of Döderlein bacilli.

TABLE III

	SERUM M1	SERUM M2	ACIDOPHILUS SERA		
			U	L	S
Döderlein M1	+	0	0	0	0
Döderlein M2	0	+	0	0	0
<i>Acidophilus</i> U	0	0	+	0	0
<i>Acidophilus</i> L	0	0	0	+	+
<i>Acidophilus</i> S	0	0	0	+	+

*+ = absorbed, 0 = not absorbed.

CONCLUSIONS

Two strains of Döderlein's bacillus were isolated from normal vaginal secretions on aerobic whey agar plates and compared with three strains of *L. acidophilus*.

The colony and cultural characteristics of Döderlein bacillus and *L. acidophilus* are very similar and the fermentation reactions interlock sufficiently so that differentiation cannot be made on those grounds.

Döderlein bacillus is serologically different from *L. acidophilus*, in fact the cultures under study differed from each other.

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1930 CHESTNUT STREET

EXPERIMENTAL LIGAMENTOUS RELAXATION IN THE GUINEA PIG PELVIS

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MORPHOLOGIC changes of the pelvis in a number of species of mammals approaching sexual maturity and during pregnancy have long been recognized. Although in a number of animals such changes are associated with actual bone absorption, as in the pocket gopher (Hisaw¹¹), these alterations ordinarily involve the interpubic ligaments at the symphysis and those at the sacroiliac articulations so

that increased mobility of the pelvic bones results. This allows for an increase in the diameter of the pelvic canal, thus facilitating labor and delivery. Barlow has described relaxation of the sacroiliac articulations in the cow in late pregnancy. P. D. Wilson and his associates have reviewed the literature as it pertains to the human subject and have added, in a paper about to be published, the results of an extended study on relaxation of the pelvic joints in pregnancy. Through their courtesy we are permitted to make this quotation: "Relaxation of the pelvic joints and particularly of the symphysis pubis is a normal accompaniment of pregnancy. Relaxation of the symphysis begins in the first half of pregnancy, progresses but slightly in the last three months, and is but little affected by parturition. Retrogression begins immediately following delivery, and is usually complete by the end of three to five months."

An extraordinary example of pelvic relaxation is found in the pregnant guinea pig. This was already noted by Le Gallois in 1812 who described how a fetus having an average head diameter of 20 mm.

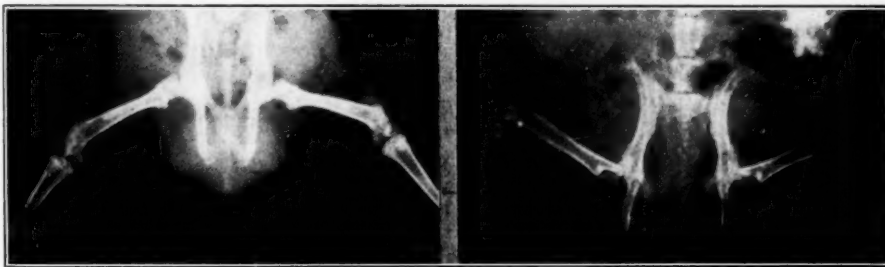


Fig. 1.—The picture on the left is from an x-ray of Guinea Pig 408 taken three days before she was mated. The picture to the right shows the same animal some six hours before parturition. Notice the marked separation of the pubic bones at the symphysis, even before the fetal head has become engaged.

is enabled to pass through a pelvis having an average diameter of 11 mm. The need of an adaptive mechanism for the expansion of a small pelvis for the delivery of proportionately large and well-developed young has been subsequently demonstrated by Duncan, Stirling, Bland-Sutton, and Whitley. This relaxation can be readily perceived even in the first third of pregnancy, is progressive, and continues until parturition at which time the 2 halves of the pelvis move very freely and are so widely separated at the symphysis that a finger can easily be placed between them. This condition is illustrated in Fig. 1.

Todd,²⁰ Kawata,¹³ and Hisaw¹¹ have described the morphologic basis of this phenomenon. Hisaw¹² in seeking the physiologic explanation of these anatomic changes discovered that this relaxation of the guinea pig pelvis is under hormonal control, and is dependent on the action of a corpus luteum hormone, to which he assigned the name "Relaxin," while the animal is under the influence of the follicular hormone. This corpus luteum hormone was found in the blood of the pregnant guinea

pig, sow, cat, dog, and mare. It was present in such abundance in the blood of the rabbit after the seventh day of pregnancy until twelve to eighteen hours after parturition, that 2 c.c. of the serum would produce noticeable relaxation of the pelvic ligaments of the guinea pig. The reaction was so constant that it could be used as an accurate method of diagnosing pregnancy in the rabbit. Hisaw was unable to demonstrate this relaxation hormone in the blood of women in the seventh, eighth, and ninth months of pregnancy. Frank and Goldberger found that the follicular hormone level in the blood steadily increases during pregnancy. Between the sixth and eighth week the results were erratic, but after the eighth week, a strong reaction could be demonstrated. Hisaw showed that a "one two" reaction between the follicular and corpus luteum hormone is necessary, the animal being required to be under the influence of the follicular hormone before the relaxin can produce its characteristic effect. He stated that perhaps a definite balance between the follicular hormone and the relaxative substance is necessary, and that since there is a high percentage of follicular hormone in the blood of women in later pregnancy, this may negate the effects of the relaxative hormone. He suggested that blood taken earlier in pregnancy might be more suitable for the test.

Such a suggestion would seem plausible at least on theoretical grounds, especially when one considers the not infrequent experience of surgeons who are unable to detect gross remains of the corpus luteum in women far advanced in pregnancy, as for instance when cesarean section is performed. Further evidence that the corpus luteum apparently loses an early function, the preparation and sustenance of an endometrium suitable for nidation and continuation of pregnancy, in later pregnancy is found in the observation that at this time the ovaries may be removed or the corpora lutea ablated without the pregnancy being terminated. Thus Fraenkel, from corpus luteum ablation experiments in rabbits, concluded that the corpus luteum is required only during the early stages of pregnancy. Herrick found, in guinea pigs, that ovariectomy was not necessarily followed by abortion. Essen-Möller and Bell have reported cases which suggest that in women the removal of the corpus luteum in late pregnancy may not produce adverse effects. It must be admitted, however, that other investigations by Hammond, Dick and Curtis, and others, have shown that the removal of the corpus luteum in the rabbit at any stage of pregnancy results in the early termination of pregnancy.

It occurred to us that the relaxing substance might be encountered in the blood of women not as far advanced in pregnancy as those cited by Hisaw, believing that thus a higher concentration of the hormone might be found, or at this time a more suitable and effective combination of interacting factors may be present.

Fifty-two adult virgin guinea pigs were used as experimental animals. These had been castrated to preclude the possibility of spontaneous cyclic relaxation of the symphysis. The animals were brought into estrum with follicular hormone, 6 to 8 units of theelin, in oil, being administered subcutaneously in divided dosages over a period of three days. Estrum could be recognized by the appearance of the typical vaginal spread. However, the opening of the vagina, i.e., the rupture

of the vaginal closure membrane described by Stockard and Papanicolaou, was found to be an adequate indication of estrum and was therefore the test most commonly used.

The animals, in the estrum thus artificially produced, were now ready for injection with human serum. To date, some 93 tests have been made. Blood from women in various stages of pregnancy was employed. The serum was drawn off and used fresh or after a brief storage in the refrigerator. This was injected intraperitoneally, the usual amount being 5 to 6 c.c. given either in single or divided dosage. The usual routine was to inject the animals in the afternoon and then to observe the absence or degree of relaxation that night and again on the following morning and afternoon. A negative result was one in which either no relaxation whatever could be demonstrated or one in which the degree of relaxation already present was not appreciably increased by the treatment. Animals showing a persistent easily perceivable amount of relaxation were culled out of the experimental colony. A positive result was one in which one could definitely recognize increased mobility of the pelvis following the injection. The results of this study are summarized in Table I.

TABLE I

DURATION OF PREGNANCY (MO.)	TOTAL CASES	RESULTS		PER CENT SHOWING RELAXATION
		POSITIVE	NEGATIVE	
1				
2	13	10	3	76.9
3	8	6	2	75.0
4	14	11	3	78.6
5	9	6	3	66.6
6	14	6	8	42.9
7, 8, 9	35	2	33	5.7

Examination of the table shows that serum coming from women in the early months of pregnancy produced relaxation in about 75 per cent of the test animals. Because of the uncertainty of reckoning the beginning of pregnancy, no listing is made for the first month. After the fifth month, there appeared to be a rather sudden drop of the relaxative substance found in the blood as determined by this test. Grouped together, in the last three months of pregnancy, were 35 cases. Only 2 of these (5.7 per cent) showed recognizable relaxation. It is not to be assumed that this relaxation is comparable in degree to that normally found in late pregnancy in the guinea pig. When thus produced, at times, the relaxation was hardly more noticeable than that frequently encountered in noncastrated virgin females during estrum (Pommerenke). However, the reaction was regarded as positive only when relaxation was definitely perceptible. During the course of the experiment, controls were run simultaneously with each test. In no case, however, could it be demonstrated that relaxation could be produced with theelin alone or with serum alone. This confirmed the findings of Hisaw. Tausk and his workers are the only ones known to us who were able to produce relaxation with the fol-

licular hormone alone. He used massive injections, 67 units daily for twenty days, of menformon, to bring about this relaxation.

Various explanations may be offered to account for the fact that our results, even in early pregnancy, were not uniformly consistent. Variations in output, accessibility, and utilization by the individual are quite possible. The important matter of dosages has not been settled. That a quantitative relationship between the follicular and corpus luteum hormones may be necessary to bring about the relaxation is at least suggested by the work of Leonard, Hisaw, and Fevold¹⁵ who showed that such a relationship actually exists in the production of endometrial changes characteristic of early pregnancy. Only further work can settle this point.

In undertaking this experiment it was thought that perhaps this test could be utilized for the diagnosis of pregnancy in woman. Ideally, if reliable, such a test would have an advantage of economy. The animals could be kept in large groups, instead of isolated as in the Friedman test. Only one laparotomy would be required, viz., the castration of the animal, and the test read by merely palpating the pelvis to ascertain the degree of mobility. However, this original enthusiasm was short-lived after it was learned that even at best only about 75 per cent of women in early pregnancy gave a positive reaction. It is altogether possible that with further work and knowledge the accuracy of this test will be improved.

SUMMARY

Castrated adult female guinea pigs were artificially brought into estrum with theelin and then injected with serum obtained from women in various stages of pregnancy.

In about 75 per cent of the cases, the animals injected with serum obtained from women in the early months of pregnancy developed perceptible relaxation of the symphysis pubis.

As pregnancy progressed, the proportion of animals reacting positively to the test grew smaller. Serum from women in the last three months of pregnancy produced positive reactions only in 5.7 per cent of the animals.

We do not feel that this test alone offers a reliable means of determining pregnancy in woman.

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PLACENTA PREVIA*

THE RESULTS OF THE TREATMENT OF 102 CASES OCCURRING IN 16,310 CONSECUTIVE DELIVERIES

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(From the Department of Obstetrics of the Methodist Episcopal Hospital)

FROM Jan. 1, 1925, to Sept. 1, 1933, there were 16,310 deliveries in the Methodist Episcopal Hospital. About half of the 102 cases of placenta previa in this number were ward patients, many of them brought in in poor condition by ambulance.

In this study only cases of partial and complete placenta previa were considered. We did not include cases of low implantation or marginal encroachment, as they are often mild and the diagnosis uncertain.

The incidence as reported varies a great deal due to different methods of classification, diagnostic ability, etc. In our series it occurred once in each 159 cases, which seems high, although higher rates have been published.

It is well known that this condition occurs more frequently in multiparas than primiparas, the ratio sometimes being as high as ten to one. In this series the ratio is nearly three to one. We have not been able to discover any reasons for this beyond those already known, such as previous endometrial pathology.

TABLE I. PARITY OF PATIENTS

Para i	28
Para ii	28
Para iii	20
Para iv	11
Para v	6
Para vi	6
Para ix	3

The mortality from placenta previa has been stated as high as 20 per cent, and the fetal mortality as high as 80 per cent. The latest

*Read at a meeting of the Brooklyn Gynecological Society, October 6, 1933.

reports are more favorable, 6 per cent being a fair average for maternal mortality. In our 102 cases two mothers were lost, which gives a rate of 1.96 per cent. Each of these two patients had a complete placenta previa which was treated conservatively.

CASE 1.—S. F., aged thirty, para iii. Intraovular bag and version followed by breech delivery, not extraction. Severe postpartum hemorrhage and shock with immediate transfusion. Uterus not ruptured.

CASE 2.—M. B., aged thirty-seven, para iii. Braxton-Hicks version and spontaneous breech delivery. Postpartum hemorrhage and shock with immediate transfusion. Uterus not ruptured.

Tables II and III show the method of treatment and the results for mother and child. They also give a basis for whatever conclusions may be drawn from this series of cases.

TABLE II. PARTIAL PLACENTA PREVIA, 68 CASES
MATERNAL DEATHS 0

Spontaneous delivery, with or without artificial rupture of membranes and binder	16	Viable stillbirths	2
Intraovular bag	18	Viable stillbirths	4
Bag and version	16	Viable stillbirths	9
Version	4	Viable stillbirths	3
Cesarean section	14	Viable stillbirths	0
Primary	13		
Secondary	1		

TABLE III. COMPLETE PLACENTA PREVIA, 34 CASES
MATERNAL DEATHS 2

Intraovular bag	3	Viable stillbirths	2
Bag and version	9	Viable stillbirths	4
Version	4	Viable stillbirths	4
Cesarean section	18	Viable stillbirths	0
Primary	15		
Secondary	2		
Tertiary	1		

Table II demonstrates that in partial placenta previa, treated otherwise than by cesarean section, the best results as far as the baby was concerned were obtained in those patients who delivered spontaneously, with or without artificial rupture of the membranes. We must bear in mind, however, that many of these cases were mild in character, with little bleeding and only a small amount of placental tissue presenting. The intraovular bag, without other manipulation, gave a little more than a 20 per cent fetal mortality. A bag, followed by version, gave more than 50 per cent mortality, and version alone was 75 per cent. In other words, intrauterine manipulation for the control of hemorrhage was likely to be fatal for the babies. We notice that version alone gave poorer results than bag and version combined. This may be partly explained by the fact that the preliminary use of a bag opens the cervix and makes the version easier. There is thus

less tearing of the placenta. After a bag is used, there is also less time elapsing between the version and the delivery than when version alone is performed in the presence of incomplete dilatation of the cervix.

Table II demonstrates that in complete placenta previa, treated by conservative measures, version alone resulted in a stillbirth in each case, but that when preceded by a bag less than 50 per cent of the babies were lost. The use of a bag alone was less favorable than when combined with version. A possible explanation is, that following the expulsion of a bag, delivery may be retarded, but that if version follows the use of the bag, the presence of one or more extremities protruding through the cervix acts as a stimulus to uterine contractions, and the baby is born more quickly. The reasons that a version alone was unsatisfactory from the fetal viewpoint have already been given. In none of the patients treated by version was an extraction performed.

I am well aware that many obstetricians feel that in complete placenta previa the baby should be disregarded. We have seen this practiced, and have carried it out ourselves for many years. However, in view of the results for both mother and child, which we are now publishing, and the results reported elsewhere regarding the treatment of this condition by cesarean section, it would seem that the baby can now be given more consideration.

Transfusion was performed once or more on 15 patients, or in 14.7 per cent of the cases.

Cesarean section was the method of treatment in 32 cases. Table IV shows the results obtained by this method in comparison with those following conservative measures.

TABLE IV. SUMMARY OF TREATMENT

Cesarean section	32
Maternal deaths	0
Stillbirths	0
Conservative treatment	70
Maternal deaths	2 or 2.85%
Stillbirths	28 or 40 %

In presenting the excellent results achieved with cesarean section, it should be borne in mind that many of these operations were performed a number of years ago, at a time when many obstetricians felt that this was not the best way to treat the condition. Neither could the high stillbirth incidence, when the vaginal route was used, be disregarded.

Miller,¹ in an excellent paper published in 1929, while allowing cesarean section in selected cases, stated that it was not warranted as a routine procedure. He stated that conservative measures give the best results. Thompson,² in his survey of cesarean sections in Los Angeles from 1922 to 1928, reports a maternal death rate

of 6 per cent when the operation was performed for placenta previa. He also tells of 36 patients in the Hopkins Clinic treated with the intraovular bag, without a maternal death. Excellent results have been reported from other sources by the use of conservative measures as far as the mother is concerned. The fetal results never bear comparison, however, and again the question of the value of the baby arises. On the other hand, Greenhill³ reports 118 cases of placenta previa at the Chicago Lying-In Hospital with 3 deaths, or 2.2 per cent. One of these followed spontaneous delivery, and the other two version and extraction. In this group cesarean section was performed 42 times without the loss of a mother. Frey⁴ reports a series of 88 consecutive cases of placenta previa delivered by cesarean section with the loss of only one mother and that from an extraneous cause.

COMMENT

In view of statistics which have been published recently, and considering our own results, we feel that cesarean section is the method of choice in most cases of partial or complete placenta previa. We realize, however, that the patient should be in a good hospital and in the hands of a competent operator. Many writers have shown that poor results may be expected if these two requirements are not fulfilled. It is imperative, of course, that blood be quickly available before, during, or after operation. If the patient must be treated at home, conservative methods would be indicated. This would apply also, if the patient were infected or the cervix fully dilated and delivery imminent. The conservative methods are probably adequate in most cases of marginal placenta previa or low implantation of the placenta, where hemorrhage is less severe and the uterus less liable to rupture. To obtain a perfect result however, a live baby should be presented to the mother, and the conservative method of treatment all too often fails to do this.

A possible objection to abdominal delivery is that a cesarean section future faces the mother. Although reports of rupture of the uterine scar are becoming increasingly frequent, I think that most of us will agree that subsequent vaginal delivery is possible in the absence of dystocia, especially if previous babies have been safely born. We should ascertain if the uterus was repaired by a competent operator and the presence or absence of infection. We should also insist that the vaginal delivery, if decided upon, be in a hospital under careful observation. It has been shown that the low cesarean scar is less liable to rupture, but we believe that the classical operation is preferable, and that an incision in the friable pathologic area should be avoided. All our cases were classical cesarean sections. Excessive hemorrhage may be controlled by packing the uterus at the time of operation with gauze soaked in mereurochrome. This is removed vaginally. In none of our cases was packing needed at this time, but in one it was necessary to pack the uterus from below several hours after operation.

SUMMARY

During a period of eight years and eight months ending Sept. 1, 1933, 102 cases of placenta previa were treated in the Methodist Episcopal Hospital. In this number, 68 were partial and 34 complete, marginal cases not being included. There were 2 maternal deaths giving a percentage of 1.96 per cent. Conservative methods were used in 70 cases with 2 maternal deaths and 28 viable stillbirths. The 32 cases treated by classical cesarean section, however, resulted in no maternal deaths or stillbirths.

In view of our results and excellent reports from other sources, cesarean section is to be recommended in most cases of partial and complete placenta previa. It not only gives maternal results as good as, or better than, the conservative methods, but in addition we need no longer completely disregard the baby, thereby saving many which would otherwise be lost.

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90 EIGHTH AVENUE

THE USE OF DILAUDID-SCOPOLAMINE IN OBSTETRICS*

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FOR many years attempts have been made to find a drug or combination of drugs which would give relief from pain during labor without slowing down uterine contractions and without producing by-effects such as nausea, vomiting, constipation, nervousness, or a dangerous euphoria. Many drugs have been produced with this ideal in view, but they have all only partly fulfilled these requirements satisfactorily. It is not the intention of the author to discuss the comparative merits of the various drugs used, but simply to set forth the results obtained in a series of cases in private practice and on the Obstetrical Service of the University of Tennessee Medical School with the combination of dilaudid and scopolamine.

Dilaudid is a recently produced drug that is promising. It is the hydrochloride of dihydromorphinone, a hydrogenated ketone of morphine. The first study of the pharmacologic action of the drug was made by Gottlieb.¹ It was found that in guinea pigs, rabbits, and dogs,

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dilaudid presented the following advantages over morphine: the effective dose was considerably smaller, the action set in more quickly and there was less interference with intestinal peristalsis.

Our interest in the drug in obstetrics was aroused by the work done by several German writers: Tollas² and Grossman³ of Berlin, Altner,⁴ and Oettingen⁵ of Heidelberg, who reported very favorable results with the drug both in obstetric and gynecologic cases.

Our series in which dilaudid was used consisted of 101 cases, of which 59 were primiparas and 42 were multiparas. Dilaudid was used in the $\frac{1}{32}$ gr. ampule form combined with $\frac{1}{130}$ gr. ampule of scopolamine hydrobromide and administered subcutaneously. Narcosis was begun in primiparas when the cervix was dilated from $3\frac{1}{2}$ to 4 cm. and in multiparas when the cervix was dilated $2\frac{1}{2}$ cm., if the quality of the uterine contractions was good. In all cases routine injection of scopolamine was used as follows: Forty-five minutes after the original dilaudid-scopolamine injection, $\frac{1}{130}$ gr. scopolamine was repeated; forty-five minutes later, $\frac{1}{260}$ gr. of scopolamine; forty-five minutes later, $\frac{1}{260}$ gr. of scopolamine; every hour or so thereafter as needed, $\frac{1}{260}$ gr. of scopolamine.

The effect of the drug combination was studied with the view of ascertaining: first, how soon the drug began to affect the patient to produce the preliminary stages of seminaresis; second, how soon the patient was asleep; third, nausea of the patient; fourth, diminution of the uterine contractions or delay of labor; fifth, asphyxiation of the baby; sixth, synergistic effect of dilaudid and scopolamine compared with scopolamine and morphine.

TABLE I. TIME REQUIRED FOR DRUG ACTION TO SET IN

	10 MINUTES	20 MINUTES	30 MINUTES	45 MINUTES	TOTAL NO. OF CASES
Dilaudid-scopolamine	80	20	1	0	101
Morphine-scopolamine	2	83	12	3	100

The initial drug action was determined by observing the patient and her response to questions. As shown in Table I practically 80 per cent of the patients felt the effect of the dilaudid-scopolamine after ten minutes. Only one patient of the series went thirty minutes and none as long as forty-five minutes. This combination of drugs was more quickly effective than the morphine-scopolamine, for in a series of 100

TABLE II. TIME REQUIRED TO PUT THE PATIENT TO SLEEP

	AFTER FIRST INJECTION	AFTER SECOND INJECTION	AFTER THIRD INJECTION	TOTAL NO. OF CASES
Dilaudid-scopolamine	14	83	4	101
Morphine-scopolamine	4	56	40	100

cases, 2 per cent reached the same state of seminarcoosis after ten minutes and 80 per cent only after twenty minutes.

It was interesting to note that 14 out of this series were asleep after the first injection, a much larger percentage than has been our experience with the use of morphine. Eighty-three per cent of the patients remembered nothing after the injection of scopolamine following the dilaudid-scopolamine administration (second injection in above table). In the morphine cases 56 per cent reached this state at this period, thus in the dilaudid series more patients were unable to pass the test of placing their finger on their nose after the second injection than in the morphine series.

TABLE III. NAUSEA DURING FIRST STAGE OF LABOR

	NONE	SLIGHT	SEVERE
Dilaudid-scopolamine	94	6	1
Morphine-scopolamine	81	15	4

As there are many factors which may account for nausea, it is difficult to say exactly which cases are due to drug action. In this series there were 6 slight and one severe case of nausea, i.e. 7 in all, or 6.8 per cent. In 100 cases in which morphine and scopolamine were used, 19 per cent were nauseated, 4 per cent severely so. All the cases of severe vomiting occurred in toxic patients.

There was no appreciable diminution of the uterine contractions in any of the patients in this series and several cases seemed to have a better quality of contractions after being relaxed by the drug.

In comparing the synergistic action of dilaudid-scopolamine with that of morphine-scopolamine there was no appreciable difference. In both series there were several patients who were in labor over eighteen hours in which the course of injections had to be repeated, giving the combination initial dose and following the course as outlined in the early part of the paper. In all of these cases the results were good. On the other hand both series had several patients going over thirty hours in whom the courses did not have to be repeated. One patient, Mrs. J., aged twenty-seven, gravida two, having a basal metabolism of plus 27, had a fourteen-hour labor and became rather restless and wide awake after the seventh injection. The course was repeated and she remained fairly well narcotized until ready for the delivery room. This same patient two years ago with her first baby received very little results from the administration of morphine-scopolamine.

In recording the cases of asphyxia of the baby it was a little difficult to get the exact data as I was unable to see all of these patients who delivered on the service at the Memphis General Hospital. The interne on the service at the time reported two cases of asphyxiated babies, one within one hour after dilaudid and scopolamine was given, and another

two hours and forty-five minutes after the administration of dilaudid-scopolamine. In the series of private cases there were no cases of asphyxia.

The following case is of particular interest in this respect. Mrs. A., primipara, aged twenty-three, with a toxemia of pregnancy, was given a medical induction of quinine and castor oil. After eight hours during which the patient had only a few contractions, one-half ampule of thymophysin was given. As a result the uterine contractions almost immediately increased in frequency and intensity to such an extent that dilaudid-scopolamine was given and the patient delivered spontaneously within thirty minutes after its administration. In this case the mother had relief from pain and the infant was born with spontaneous cry and respiration, showing no signs of asphyxia.

Along with the present series, dilaudid was given rectally by suppository, in doses of $\frac{1}{24}$ gr., to relieve afterpains. The suppositories were used on a series of 20 patients, multiparas, and gave relief within twenty to thirty minutes. In 12 cases one suppository was sufficient to hold the patient the entire night, 7 patients received a second suppository after five or six hours and one patient obtained no particular relief.

CONCLUSIONS

Dilaudid and scopolamine is a satisfactory combination for semi-narcosis for use in obstetric cases. In this combination dilaudid has advantages over morphine in that it is quicker in action and less apt to nauseate. In our series there was very little interference from dilaudid with the strength and frequency of the uterine contractions and no untoward effects of the drug on the child were observed.

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899 MADISON AVENUE

PREDICTING THE SEX OF THE UNBORN CHILD

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LAST year Dorn and Sugarman¹ published an article on the correct prediction of sex in 80 out of 85 unborn children. Their method of procedure was to inject 10 c.c. of the mother's urine intravenously into a male rabbit and examine microscopically the testicles removed forty-eight hours later. The animal had to be about three months old and was useful only during the period when the testicles were descending. They claimed that spermatogenesis had not begun in the normal animal of this age. If the child in utero were a female, spermatogonia and spermatocytes could be demonstrated, but if it were a male the testicles appeared normal.

As this procedure is not practical even for most of the large clinics, because of the difficulty of keeping on hand rabbits of a certain age, and their use for the experiment being limited to about two weeks of their life, we have attempted to predict the sex of the unborn child by using the white rat as the experimental animal.

The rats used are from the colony of the Department of Obstetrics and Gynecology of the University of Chicago. Only litter mates were used for each experiment. In order to standardize our rat colony for the work, we killed litters from the ages of twenty-four to forty-seven days at two-day intervals. When the rats were killed each one was weighed and the gross appearance of the testes and seminal vesicles were noted. The testes were not weighed, as Dr. Moore had found that there was no constant weight change noted after urine from pregnant women was injected. The testicles were removed carefully and fixed overnight in Bouin's solution (75 parts saturated aqueous solution of picric acid, 25 parts formalin, 5 parts glacial acetic acid). During fixation they were cut so that only sections through the center of each testicle would be made. The specimens were cleared with ascending percentages of alcohol and oil of wintergreen. Paraffin blocks were made, cutting sections of 5 μ each, and staining with hematoxylin-eosin.

We discovered, as we had suspected, that beginning spermatogenesis could not be determined in the rat. This necessitated the choice of another end-point for the reading, so the first appearance of sperm heads was used because of the ease in locating them and the definite end-point. The sperm heads are first seen at different ages in various strains of rats, so each colony must be standardized. Our animals constantly first showed sperm heads in the tubules on the fortieth day, usually on the thirty-ninth, and occasionally on the thirty-seventh and thirty-eighth days. Approximately 80 animals were sacrificed and careful examination of their testes was made in this preliminary study.

For the actual experiment we injected litter mates on the thirty-first day and autopsies were made on the thirty-fifth day. If there were only two males in a litter, one was used as the control and the other for the injection. If there were more than two, one was used as the control and the others for injections of urine from various patients. Therefore, we had a control slide of the testes from each litter. Litter mates were injected with 2 c.c. of urine from the pregnant patient twice a day for three days, and killed forty-eight hours after the last injection.

The male litter mates from eleven litters were used—a total of 43 animals. The urine from each of 32 patients was injected into these animals, as described above, and the other 11 animals were used as controls, the control animal each time being the largest of its litter.

The microscopic examination of slides made from the testes of the animals showed 4 positive controls and 7 negative controls. Nine other slides showed the presence of sperm heads in the testes. Of these, 5 animals had been injected with urine from women who later gave birth to males, and 4 gave birth to females. The testes from the other 23 injected animals did not show the appearance of sperm heads. The average weight of all of the animals was 60.5 gm.; of the controls, 67.0 gm.; and of the positive injected animals, 66.5 gm.

SUMMARY

The experiment shows that the appearance of sperm heads in the testes of the rat occurs at varying ages, usually not until the thirty-sixth to the fortieth day, but occasionally at thirty-five days if the animal is larger than the average.

Injection of urine from women in the last trimester of pregnancy did not uniformly stimulate spermatogenesis to the production of sperm heads prematurely. The few injected animals that were positive were above the average weight of the entire series and the sex of the unborn child proved to be males in five instances and females in four.

CONCLUSIONS

The injection of urine from pregnant women into immature male rats does not stimulate the process of spermatogenesis, as read by the appearance of sperm heads.

I wish to express my appreciation to Dr. Carl Moore, Professor of Zoology of the University of Chicago, for his many helpful suggestions.

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5848 DREXEL AVENUE

THE IMPERMEABILITY OF THE PLACENTA TO PROLAN B.

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THE Aschheim-Zondek test for pregnancy is, essentially, a determination of the presence of an increased level of an anterior pituitary hormone. The test material may be blood, urine, cerebrospinal fluid, or other body fluids, or extracts of tissue. As has been discussed in numerous papers on the subject, the anterior pituitary gland, in addition to other hormones, secretes two sex hormones. One is the hormone which stimulates the ovary to follicle formation, Hypophysenvorderlappen Reaktion I (HVR I), while the other is responsible for the hemorrhage into the follicle forming the "Blutpunkte," Hypophysenvorderlappen Reaktion II (HVR II),¹ and corpus luteum production, Hypophysenvorderlappen Reaktion III (HVR III). The technic of the rabbit test as performed in this laboratory has been discussed in previous papers.^{2, 3} Virgin does of approximately 1500 gm. are injected once only, intravenously, with 2.0 to 3.0 c.c. of blood serum. The ovaries of the rabbit are examined at autopsy or operation in forty to forty-eight hours, hours after injection.

The expression "positive Aschheim-Zondek test" or "positive Friedman test" has come to mean, essentially, an HVR II or/and an HVR III. Blood serum and plasma, urine and fluid from ovarian cysts removed during pregnancy have given HVR II-III results which are "positive" tests. Cerebrospinal fluid causes only follicle production, without hemorrhage, and is said to cause an HVR I or "negative" test.⁴

An abstract in a recent journal⁵ states that "The Aschheim-Zondek test is *positive* in the urine of the newborn for four days and at times for a longer period." Reference to the original article⁶ reveals that "in the urine of newborns this hormone (a sexual hormone) can be found by the Aschheim-Zondek method. It remains there normally for the first four days." This excerpt is part of a discussion concerning the treatment of premature infants with ovarian hormone. While the abstract is literally true and the "positive" Aschheim-Zondek test is an HVR I, it does not fit the usual interpretation of a "positive" test.

This question concerning the presence of hormones in the fetal circulation renewed our interest in the problem of the permeability of the placenta to various hormones. Snyder and Hoskins^{7, 8, 9} have demonstrated that adrenalin, insulin, pituitrin and parathyroid extracts are not transmitted from the fetus to the mother. Schlossmann¹⁰ concludes that the placenta is not permeable to insulin. The observations of Allen¹¹ upon partially depancreatized dogs during pregnancy "are opposed to the view that any appreciable quantity of internal pancreatic secretion passed

from the fetus to the mother." Schlossmann,¹² in a complete review of the subject of "Interchange of substances between Mother and Fetus through the Placenta," discusses the permeability of the placenta to various hormones. The work of Cattaneo and Schlossmann indicates that the placenta is permeable to adrenalin; Cattaneo and Rupp independently conclude that unusually large doses of posterior pituitary hormone injected into fetuses produce blood pressure changes in the mother which indicate transmission of this substance through the placenta. It is not the purpose of this paper, however, to discuss the transmission of other than the pituitary hormones.

With regard to the sex hormones, Zondek¹³ concludes that ovarian hormone as determined by injection into castrated mice, is present in cord blood. Aschheim,¹⁴ 1927, stated that the anterior pituitary hormone was present, in a series of cases, in the cord blood. No mention is made, however, whether it was a Prolan A or Prolan B reaction. The estrus-inducing anterior pituitary hormone, according to Zondek, Fels, Brühl, Philipp and Siegert¹² is found also in the cord blood, but it is questionable whether this "anterior pituitary hormone" is not built in the placenta. Brühl¹⁵ noted the HVR I in six cases in which cord blood was injected. In this series the HVR II was never observed. If the placenta is permeable to the hormone which is responsible for the "positive" pregnancy test, i.e., hemorrhagic follicles and corpus luteum formation, the test as performed routinely should show evidence of the presence of this hormone by demonstrating hemorrhagic follicles in the ovaries of the test rabbit after injection with cord blood or the urine of the newborn infant.

TABLE I.

SERIAL NO.	TEST MATERIAL	C.C. INJECTED	REACTION
557	Cord blood serum	2.0	Mild I
558	Cord blood serum	2.5	Mild I
559	Cord blood serum	2.5	Mild I
560	Blood serum from mother of 559	2.4	II
562	Urine from 559 taken during first 36 hours of life	10.0	I
564	Cord blood serum	2.0	I
571	Blood serum from mother of 572	2.5	II
572	Cord blood serum	7.0	I
581	Cord blood serum	5.0	Mild I
582	Cord blood serum	5.0	Negative
583	Cord blood serum	3.0	Negative
584	Cord blood serum	4.0	Negative
585	Cord blood serum	2.5	Negative

In this series of experiments, cord blood was collected at the time of delivery and the serum was injected into virgin does of 1,500 gm. in the usual manner. To obviate the possibility that the hormone is present in more dilute concentration in the cord blood than in the maternal blood, two to three times the customary volume of serum was injected.

RESULTS

A series of rabbit tests was performed using cord blood serum as the test material. Some of the tests were controlled with mother's blood serum taken at the time of delivery.

Varying degrees of reactions resulted, varying from negative and very mild reactions in which a few small follicles were noted in the ovary of the rabbit to large

numbers of such follicles. In no case, however, were hemorrhagic follicles, "Blutpunkte," noted. Quite uniformly the uterus was noted to be engorged, the reaction noted with injection of ovarian hormone (theelin).

CONCLUSION

The hormone responsible for the hemorrhagic follicle and corpus luteum production in the Aschheim-Zondek, Friedman, or other such tests does not pass through the human placenta.

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RACIAL, GEOGRAPHIC, ANNUAL, AND SEASONAL VARIATIONS IN BIRTH WEIGHTS

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IN 1932 Atlanta had a negro population of 98,293. Seventy-seven per cent of the negro infants, a total of 1,656, were born in Grady Hospital. Across the street, in the white unit, there were 1,392 infants born during the same year. Thus is afforded a comparison of races under similar conditions. In the Emory University Hospital practically all the patients come from the best strata of society and furnish a group for comparison with a lower economic level as seen in Grady Hospital.

In Table I are compared the average birth weights of 3,255 normal nonsyphilitic negro infants, 1,801 ward white infants, and 955 private patients.

TABLE I

Negro infants	6 pounds 14 ounces
Ward white infants	7 pounds 8 ounces
Private white infants	7 pounds 10 ounces

It is seen that there is a difference of only two ounces in the average weights of the two groups of white infants at birth, while there is a difference of ten ounces between white ward infants and negroes. It was found that there was little difference between the former groups

in the number of developmental defects such as umbilical hernias. There is a good deal of evidence which would lead one to believe that the pigmented skin of the negro filters out much of the available ultraviolet light, thus probably playing a part in the production of weaknesses and lessening birth weight.

GEOGRAPHIC VARIATIONS

Through the cooperation of obstetricians and pediatricians in various parts of the country, I was able to compare the average birth weights of white infants from widely separated areas. Studies of our own annual averages indicate that there is some annual fluctuation, and while the weights shown in Table II are the averages of approximately 1,000 cases from each locality, and covering at least a year's time, it is possible that the weights might vary if they covered a larger number of cases over a longer period of time.

TABLE II

Atlanta	(2,576)	7 pounds 9.0 ounces
Iowa City ¹	(1,013)	7 pounds 5.6 ounces
New Haven ²	(891)	7 pounds 6.7 ounces
Los Angeles ³	(689)	7 pounds 4.0 ounces
St. Petersburg ⁴	(1,046)	7 pounds 7.0 ounces

Seasonal variations in birth weight, to be shown later, indicate the possible connection between quantity of sunshine in any given community and the average birth weight for that community. With the notable exception of Los Angeles, the weight rises considerably as we approach the southern portion of the United States. It is not possible to take into consideration the quantity of ultraviolet actually reaching the surface of the earth. Fogs, smoke, and dust affect it a great deal. Studies are being made, at the present time, to determine variations caused by such factors. Since the pigmented skin of the negro is known to filter out ultraviolet light, it is quite possible that excessive tanning, such as seen at seaside resorts, may have the same effect to a lesser degree.

Robertson⁵ has shown variations in birth weight in London as compared with Australia, suggesting that the fogs of London play a large part in reducing the average birth weight of infants born there as compared with those born in Australia of similar parentage.

Table II shows that the average for Atlanta is higher than any other city studied. Atlanta's altitude of 1,100 feet above sea level may play a part in making available greater quantities of ultraviolet light.

SEASONAL VARIATIONS

Table III shows the seasonal variations in birth weights for infants born in the cities mentioned above. It will be seen that the same trend holds true for each with the exception of Iowa City.

TABLE III

	ATLANTA		ST. PETERS- BURG		LOS ANGELES		NEW HAVEN		IOWA CITY	
	pounds	ounces	pounds	ounces	pounds	ounces	pounds	ounces	pounds	ounces
Winter Quarter	7	4	7	5	6	14	7	3	7	6
Spring Quarter	7	10	7	9	7	4	7	7	7	5
Summer Quarter	7	8	7	7	7	8	7	8	7	6
Fall Quarter	7	5	7	7	7	4	7	7	7	6

Table IV shows a summary of the 4,799 birth weights above, an average taken from widely separated portions of the United States.

TABLE IV

Winter	(1,317 cases)	7 pounds 3.8 ounces
Spring	(1,048 cases)	7 pounds 7.4 ounces
Summer	(1,209 cases)	7 pounds 7.4 ounces
Fall	(1,285 cases)	7 pounds 6.3 ounces

The average birth weight, by seasons, seems to have a tendency to follow the curve of sunshine; low in winter, higher in spring and summer, and low again in the fall. This same tendency was seen in a study of seasonal variations in 3,427 negro infants born at Grady Hospital during 1931 and 1932.

ANNUAL VARIATIONS

Table V shows the annual average birth weights for negro infants born in Grady Hospital during 1930, 1931, and 1932, a total of 3,255 live births.

TABLE V

1930	(828 cases)	6 pounds 15.7 ounces
1931	(1,154 cases)	6 pounds 13.7 ounces
1932	(1,273 cases)	6 pounds 11.5 ounces

It is seen that there has been a steady decline in the annual average for negroes during the depression years of 1930, 1931, and 1932. During this period there has been a rapid decline in the mortality rate for the first year of life, in these groups, but little change in the mortality rate for the first week. The latter rate is determined by natal and prenatal causes. The rate for the first year of life in Atlanta has declined from 66 per thousand live births to 58 per thousand in the whites and from 145 to 90 per thousand in the negroes.

It is interesting to note that a declining birth weight is just the reverse trend for the decline in mortality in the first year of life. The falling mortality rate is strongly influenced by better infant care

and feeding, and since a large majority of the negro infants in Atlanta are hospital delivered most of them return to the well baby clinic for feeding directions and observation. The falling birth weight undoubtedly is greatly influenced by nutritional deficiencies in the mothers as a direct result of the depression. This emphasizes the importance of the prenatal period.

CONCLUSIONS

1. There is a marked difference between the birth weights of the negroes and a corresponding economic level in the white race with only slight differences between private and ward white patients.

2. There is a considerable difference between the average birth weight of white infants in different parts of the United States, with a tendency to increase in the southern portion.

3. There is a seasonal difference in birth weight for the negro and the whites with a tendency to follow the curve of sunshine.

4. There has been a steady decline in the average birth weight of the negro during the depression years of 1930, 1931, and 1932.

5. It would seem that availability of ultraviolet light to the pregnant mother plays an important part in influencing the birth weight of the infant.

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205 EXCHANGE BUILDING

SOME OBSERVATIONS ON THE RUPTURE OF THE GRAAFIAN FOLLICLES IN RABBITS

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DURING the execution of a series of pregnancy tests conducted according to the rabbit method of Friedman's¹ modification of the original Aschheim-Zondek technic, we became interested in the mechanics of the rupture of the ovarian follicles. We were anxious to observe the actual maturation and rupture of these follicles under the stimulation of the urine injections. It was estimated² that the process takes about ten hours, but we found no record that the thing had actually been observed.

Through the kindness of Dr. E. E. Ecker, we were permitted to use his laboratory and apparatus. He also gave his more valuable ad-

vice and aid in applying his technic for observing the opened peritoneal cavity during life. By his method,³ the rabbit is put to sleep under urethane; the abdominal cavity opened and expanded by a special bottomless trough. The whole peritoneum is filled with warm liquid petrolatum, kept at a constant temperature of 38° C. by the use of a carbon electric light bulb. Thus the living viscera may be watched going through fairly normal activities during periods of as much as twelve to fourteen hours. Four rabbits were thus observed. Injected with urine that had previously given positive reactions, the rabbits were opened about eight hours after the intravenous injection. Even that early, many follicles showed marked swelling, projecting well above the general surface of the ovary. As time passed, this protrusion became more marked. Evidently, the fluid was under increased tension. When a fine capillary glass tube was stuck into a full-sized follicle of an uninjected rabbit, the fluid would rise in the tube 1 cm. or less. Whereas, when such a tube tapped one of these stimulated, protruding follicles, the fluid would rush up 5 or 6 cm. As time passed, a fine network of blood capillaries might be observed working in from the edge toward the center. These became more numerous, thicker, and more branching. Yet always a clear spot that showed no capillaries remained near the apex of the follicle, even under low power magnification. The picture reminded one of the fovea centralis of the eye retina. Finally, a tiny trickle of blood appeared in the oil at this stigma, and a magnifying glass showed a minute puncture at the point where there were no capillaries. There appeared a minute current of the follicle fluid that would not mix with the oil. The earliest follicle to rupture presented the tell-tale trickle of blood ten and one-half hours after the urine injection had been given.

By opening rabbits at intervals after injection, we found one ruptured follicle as early as nine hours after the stimulation. It is our belief that the tense follicles may rupture earlier when the abdomen is not open, and the normal active movements of the rabbit are frequently causing increased intraabdominal pressure.

Voge⁴ has shown that the urine of many pregnant women, when heated with dilute bromine water, will give a transient pink color. This test was tried with specimens from a number of patients known to be pregnant. The color appeared in about 72 per cent of the tests; not enough to give the reaction much value clinically, but sufficient to excite our interest. Now, this pink color with bromine is a recognized test for histidine. Moreover, in 1932, Armstrong and Walker⁵ proved that this reaction actually is due to histidine, for they extracted that substance from the urine of pregnant women. Was it possible that histidine in the injected urine caused the rupture of the rabbit's follicles? Histidine chloride, in doses of 2 mg. per kilo. of

body weight, was injected into the marginal ear veins of two rabbits. The ovaries and other genitalia showed no reaction whatever.

By the addition of a CO₂ group, the toxic histamine is converted into the less harmful histidine. The body tissues cause this change very rapidly. Possibly histamine produces the ovarian reaction, yet has been changed to the histidine before it is detected by the pink color with bromine water. So Burroughs, Wellcome and Company's "Ergamine" was injected into the vein of a rabbit, in the dosage of 0.2 mg. per kilo. of body weight. Intramuscular injection was also tried. Again, the genitalia showed no reaction at all. So, whatever hormones may be responsible for the phenomenon, it seems unlikely that they are nucleic acid derivatives of the histidine group.

SUMMARY

With abdomen opened, under direct observation, ovarian follicles of a rabbit began to rupture ten and one-half hours after the injection of urine from a pregnant woman.

This Friedman phenomenon is not due to histamine or histidine in the urine of pregnant women.

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10515 CARNEGIE AVENUE

HYPERTENSION SIX WEEKS POSTPARTUM IN APPARENTLY NORMAL PATIENTS

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IT HAS been a matter of frequent observation in the postpartum clinic of the Department of Obstetrics of the Johns Hopkins Hospital that certain patients who had been followed through a normal pregnancy, labor, and early puerperium returned six weeks after delivery with hypertension, albuminuria, or both. This fact was considered of sufficient interest to warrant a study of a series of consecutive cases in an attempt to discover the frequency of this phenomenon, if possible, its etiology, and finally the ultimate outcome so far as the patient was concerned. For this purpose we have investigated the case records of normal, nontoxemic women delivered at or near term by the service between Sept. 1, 1930 and Dec. 31, 1931, who returned for examination six weeks after delivery. Only those patients who had been observed for at least

one month antepartum were included and every effort was made to complete their postpartum follow-up for at least a year. It was desired primarily to ascertain if any latent chronic renal involvement had developed and to determine whether such factors as age, parity, length of labor, or morbid puerperium seemed to be contributory in the occurrence of hypertension six weeks postpartum.

It was found that 592 patients who had experienced a perfectly normal pregnancy, labor, and puerperium had been delivered during this sixteen-month period and had returned six weeks postpartum for follow-up study. Of these 102 or 17.22 per cent at the postpartum visit showed hypertension (systolic pressure 140 mm. or above, or diastolic 90 mm. or above), albuminuria (definite trace or more), or both. Sixty-seven

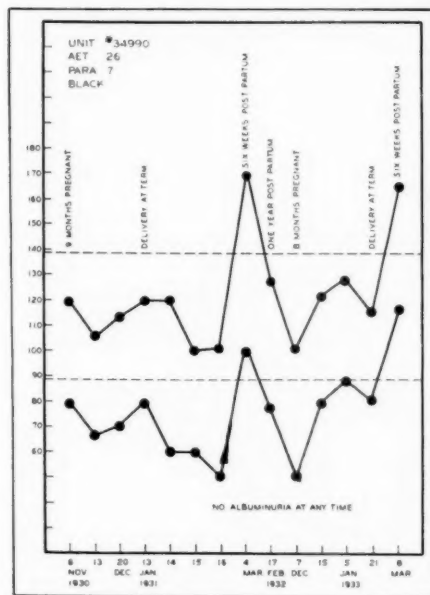


Fig. 1.

of these 102 patients were followed in the toxemia clinic for at least a year and form the basis for further discussion, while the remaining 35 were lost sight of in less than a year from the time of their delivery.

TABLE I

Total cases abnormal 6 weeks postpartum and followed one year or more	67
Normal within one year	61 (91.04%)
Hypertension persisting after one year	6
Subsequent normal pregnancies	27 (40.29%)
Subsequent abnormal (toxemic) pregnancies	1
Subsequent normal pregnancies with recurring postpartum rise	7

Table I shows the outcome to those patients with postpartum hypertension who were adequately followed for one year or more. It is of interest to note that 91.04 per cent showed a prompt return of blood

pressure to normal and that 40.29 per cent of them had subsequent normal pregnancies, with a recurring six weeks' postpartum rise in 7 cases. Only one of the 6 cases in which hypertension persisted showed subsequent evidence of definite toxemia.

TABLE II

Systolic Blood Pressure at Six Weeks Return

-139	19	23.17%
140-159	47	57.32%
160-	16	19.51%

Mean 149.21

Diastolic Blood Pressure at Six Weeks Return

- 89	13	15.85%
90-109	60	73.17%
110-	9	10.98%

Mean 96.46

Table II demonstrates the degree of hypertension at six weeks postpartum in 82 cases of the series. While in the majority of instances the blood pressure was only moderately elevated, it should be noted that

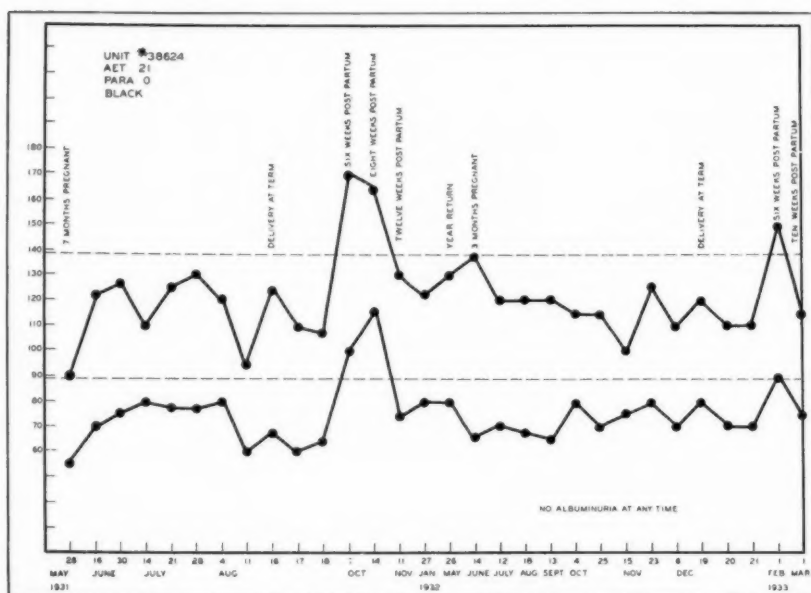


Fig. 2.

in 19.51 per cent the systolic blood pressure was 160 mm. or above and in 10 per cent the diastolic was 110 or above. The mean pressure for the series was 149.21 systolic and 96.46 diastolic. Albuminuria occurred at six weeks postpartum in only 8.54 per cent of the cases. Of the patients exhibiting postpartum hypertension 26.83 per cent were primiparas while the remaining 73.17 per cent, or almost three-quarters of the cases, occurred in multiparas. The time at which the blood pressure returned to normal was found to vary from two to six months post-

partum. A morbid puerperium was found in 20.73 per cent of the cases, but this high incidence was chiefly explainable by the fact that negro women comprised 68.29 per cent of the series, and it is our experience that a high morbidity rate pertains in this race.

DISCUSSION

It would seem from the above findings that as a rule hypertension occurring six weeks postpartum in a patient who has previously had a normal blood pressure is a transient affair and that in the large majority of cases is not an indication of permanent renal damage. It does not tend toward a subsequent toxemia of pregnancy. The frequency of its occurrence in multiparas and particularly in the black race might indicate that it is a compensatory phenomenon resulting from the strain of too frequent pregnancies or too early an attempt on the woman's part to return to her household duties.

We append herewith charts of two cases in the series which illustrate not only the transient hypertension of the late puerperium but also its recurrence in a subsequent pregnancy.

CONCLUSIONS

1. Among 592 cases in which pregnancy, labor and early puerperium were entirely normal, there were 102 or 17.22 per cent in which hypertension was present six weeks postpartum.
2. In 91.04 per cent of the above cases, the hypertension was a transient phenomenon leaving no evidence of permanent damage.
3. Hypertension may occasionally occur following successive normal pregnancies without tendency toward eventual toxemia.

My thanks are due Dr. C. H. Peckham for his assistance in preparing this paper.

MECONIUM PERITONITIS FOLLOWING SPONTANEOUS INTRAUTERINE PERFORATIONS OF JEJUNUM

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MECONIUM peritonitis is a distinct entity, in contradistinction to bacterial peritonitis of the newborn. The former is a foreign body, chemical peritonitis resulting from escape of sterile meconium into the peritoneal cavity, and is in no way related to bacterial inflammation; the latter is a bacterial peritonitis of the newborn, usually complicating such diseases as infections of the cord or maternal septicemia. Meconium peritonitis is therefore a nonbacterial chemical peritonitis analogous to the chemical cholecystitis produced by Mann¹ with Dakin's solution and by Wolfer² with pancreatic juice. The term meconium peritonitis is restricted to those cases in which meconium, calcified plaques and foreign body giant cells are found in the peritoneum. The cause of escaped

meconium into the peritoneal cavity is a rupture of some part of the intestine, which may occur early in fetal life, just prior to, during, or shortly after labor.

The meconium, as described by Williams,³ is sterile and composed of epithelial cells, bile salts, bile pigments, fats, salts, and mucin. Because the meconium is sterile, and the conditions conducive to intestinal perforation arise early in fetal life, the resulting peritonitis is definitely a chemical or nonbacterial one. If, however, the rupture does not occur until the time of labor as a result of the mechanical manipulation, or shortly after labor due to increased peristalsis, the resulting peritonitis will not be purely a chemical one; a few hours after delivery, the originally sterile meconium becomes laden with microorganisms, and a bacterial etiology is superimposed upon the chemical one for the resulting peritonitis.

The presence of meconium in the intestine together with early peristalsis in fetal life is necessary for intestinal rupture. It seems reasonable to assume that the meconium, which can be demonstrated at about the third month and forms first in the upper intestine, is propelled downward principally by peristalsis. While no direct evidence has been observed, incidental findings such as the following indicate the presence of peristalsis rather early in fetal life: Anomalous communications of the intestine which divert the meconium are usually associated with atresia below the anomaly; marked dilatation above the obstruction and constriction of or pinpoint lumen below the obstruction; cases of fetal intussusception.

It is therefore conceivable that the meconium as an irritant of some kind, stimulates peristalsis in the early months of fetal life. The peristalsis then drives the meconium progressively downward, and in so doing aids in the development of the intestinal lumen.

This downward course of the meconium may be the important factor in the production of a perforation, particularly where an obstruction exists. At least 50 per cent of the cases of meconium peritonitis are associated with obstruction.

Davis and Poynter⁴ collected 392 cases of intestinal obstruction, without intestinal perforation, indicating other causative factors, such as maldevelopment of wall, volvulus, intussusception and external bands. Farr and Brunkow⁵ speak of congenital abnormalities as a factor. Hughes⁶ described a case of perforated ulcer in the transverse colon, caused by obstructed meconium, and Bullowa and Brennan⁷ described a similar case in the terminal ileum. Kornblith and Otani⁸ report a case in which the pancreatic duct was stenosed, and the meconium was very fatty and puttylike. The explanation given is that the absence of pancreatic secretion altered the meconium, which became so thick and puttylike that it could not be propelled on its natural course downward, and, therefore, piled up in the intestine to the point of perforation. Boikan⁹ has quite recently given a very complete description of meconium peritonitis, with a report of one case and an extensive review of the literature.

CASE REPORT

The mother, a white woman, aged thirty-four, was a para vi who about the sixth month of this pregnancy, first saw Dr. Loar on December 24, 1929. He had delivered her last three children, all spontaneous deliveries, and normal children. One month later she was kicked in the abdomen by her seven-year-old son, and she had abdominal pain for two days. On March 7, 1930, she reported a very rapid increase in the size of her abdomen, and complained of swelling of the feet. Upon examination at this time her blood pressure was 120/90, her urine was negative, but the fetal heart tones could not definitely be heard, and there was an obvious hydramnion. Despite advice to the contrary she went home. One week later, on the fourteenth, she was brought to the hospital in labor. The position was a persistent occiput posterior, and after a very short labor she delivered spontaneously. The mother made an uneventful recovery and on April 9, 1931, about one year later, had a precipitate delivery of a normal male child.

The infant was full term and well developed. Inspection just after birth revealed small petechial hemorrhages over the skin, and a markedly distended abdomen. Respiration was very shallow and slow, and despite all efforts the baby died twenty minutes after delivery, having made only a few weak cries.

Postmortem Examination.—The body was that of a full-term, well-developed, male infant. The abdomen was markedly distended and small petechial hemorrhages were found on the skin over the abdomen and thighs. The abdominal cavity contained about 50 c.c. of muddy colored, cloudy fluid which contained reddish yellow flakes. The intestinal loops were matted together and covered with many irregular reddish gray masses which were granular and firmly adherent. The intestines were of an unusually reddish gray color and everywhere between the matted loops these peculiar colored flakes could be found in smaller and larger masses. The loops were held together by firm, dense, fibrous adhesions. In the upper right abdomen, posteriorly, there was an attachment between matted loops of bowel and the peritoneum, by a large flaky mass which extended over the surface of the liver. On freeing this attachment a large, irregular mass remained with the peritoneum. The freed bowel, a portion of jejunum, presented two very small openings in the intestinal wall, not much larger than pinpoint in size, from which a few bubbles of greenish material could be expressed upon pressure. On cut section, through this portion of bowel, the openings extended through all coats. Examination of the bowel at point of and below perforations failed to reveal any definite obstruction. There was no narrowing beyond, or dilatation above the perforation.

The peritoneum was rough and greatly thickened in many areas, particularly in upper right quadrant at point of bowel attachment.

The spleen was slightly enlarged, soft and the cut section showed a deep red pulp in which the markings were obscured.

The kidneys were smooth and grayish brown. Cut section was purple red.

The liver was rather firm and the surface showed many fine, granular, flaky attachments. The cut section was very wet with dark blood; the markings obscured.

Heart and lungs were normal.

Microscopic Sections.—*Peritoneum:* Fibrous thickening, round cell and giant cell infiltration. There were large masses of poorly staining calcareous particles. *Jejunum:* (Edge of perforation.) Glands were slightly dilated. There was an increase in lymphatic tissue. *Spleen:* Capsule was thick, and the pulp was quite cellular. *Kidneys:* There were focal areas of lymphocytic infiltration. *Liver:* Capsule was thick with adherent calcareous particles. Blood spaces were dilated and engorged with blood.

Anatomic Diagnosis.—There was meconium peritonitis following intrauterine perforations of the jejunum, extensive calcification of peritoneum extending to the

liver and spleen capsules, chronic tumor of the spleen, moderate interstitial nephritis, marked congestion of liver, and petechial hemorrhages of skin over abdomen and thighs.

SUMMARY

Meconium peritonitis is a nonbacterial, chemical inflammation of the peritoneum caused by escape of meconium into the peritoneal cavity, either in fetal life, at time of delivery, or very shortly after delivery. The escape of meconium is due to an abnormal opening somewhere in the intestine; such perforation is often associated with bowel obstruction due to such causes as imperforate lumen, congenital bands, or other anomalies.

A case of meconium peritonitis without obstruction, is here reported for which no definite etiology is found. The peritonitis resulted from two very small openings found in the jejunum. There was no obstruction at point of, or any change in diameter of lumen either above or below, the perforations. No microscopic change was seen in the intestinal wall other than a mild increase in lymphatic tissue.

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525 GRIESHEIM BUILDING

TUBERCULOSIS OF CERVIX UTERI*

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TUBERCULOSIS of the uterine cervix is a rare condition as compared with tuberculosis of the fallopian tubes or of the endometrium. The case which I am now reporting is the third which I have seen in twenty-five years of gynecologic practice. Norris states that out of 15,130 gynecologic specimens examined in the University of Pennsylvania only 4 cases of tubercle of the cervix were reported. In 1919 Moore found only 20 cases of primary and 150 cases of secondary tuberculosis of the cervix reported in the literature.

Mrs. J., a colored woman, born in the British West Indies, presented herself at the Gynecological Department of the Vanderbilt Clinic complaining of blood-stained vaginal discharge. She was thirty-eight years of age, had been married for five years, and had never been pregnant. There was no family history of tuberculosis, cancer, or nephritis. Her mother was alive at the age of seventy-four; her father had died at the age of eighty. To her knowledge there had been no personal exposure to tuberculosis. Her husband was healthy.

*Read at a meeting of the New York Obstetrical Society, November 14, 1933.

She herself had had no previous illnesses except measles as a child, and an indefinite "stomach ailment" of a few weeks' duration three years ago. There was nothing in her history to suggest abdominal tuberculosis at any time. She had had nocturia for as long as she could remember. Menstruation began at seventeen, and had always been irregular with a scant flow and no pain. During the year prior to admission the intervals between the periods had been tending to lengthen and she had missed one period completely.

The symptom which brought her to her doctor was vaginal discharge. This had been present for two years, at first white or yellow in appearance, but for the past six months blood stained, never profuse, occasionally irritating. For six months she had had occasional attacks of pain in the lower right abdomen. These were never severe and lasted usually only for a day at a time. She had never felt that she was feverish. There was no loss of weight. Her appetite had always been good. She was rather small but well nourished, and did not look her age. An exhaustive general examination which included x-ray of the lungs, thorax, and abdomen failed to reveal any evidence of tuberculosis. On abdominal palpation there were no areas of tenderness or resistance and there was no evidence of free fluid.

Pelvic examination showed a rather narrow, nulliparous vagina. The vaginal portion of the cervix was small, the external os patulous and the edges irregular, ragged, soft, almost diffluent. On introducing the finger into the canal the same feeling was noted. The ragged edge was not friable and hard as in carcinoma. The body of the uterus was small and felt fixed. On each side an indefinite thickening could be felt suggesting tubal thickening and fixation. On examination under anesthesia before operation definite tubal thickening was diagnosed. As seen through the speculum the external os was irregular in outline, and there was exposed through it a dark red polypoidal tissue covered with brownish secretion.

While these findings were typical of the two other cases I had seen and of the cases described in the literature, a definite diagnosis of tuberculosis could not have been made without biopsy. This had already been obtained by her physician and the microscopic slide brought by the patient showed typical tuberculous tissue.

Extirpation of the uterus and cervix was advised and consented to by the patient. As a preliminary the edges of the external os were approximated by a catgut suture to prevent escape of tuberculous material in the operative field. The operation was done by the abdominal route and presented no technical difficulty. While both tubes were much enlarged and nodular, there were no adhesions to omentum or intestine. No calcified nodes were found in the abdomen.

The specimen consisted of the uterus and cervix together with both tubes and ovaries.

The body of the uterus was small in proportion to the cervix. The external os presented the appearance already described in the clinical findings (Fig. 1). On vertical mesial section the disproportionately small body of the uterus was well seen (Fig. 2). The cervical canal was expanded and excavated. Its lining showed the same polypoidal irregularities as those noted at the external os. At the internal os there was an abrupt change in appearance, the uterine cavity being represented by a mere slit between the walls, and there was no evidence of pathology in the mucous membrane (Fig. 2).

Microscopic examination of the cervix showed a general thickening and irregularity of the mucous membrane lining the canal. The cervical glands were increased in number and were hyperplastic. Scattered throughout the stroma were many areas showing central necrosis with a secondary layer of epithelioid

cells and leucocytes, among which were occasional giant cells. These nodules were scattered irregularly throughout the mucous membrane, especially in its superficial layers. In the deeper layers they were fewer in number and only a few were situated in the submucosal tissue. In the region of the internal os the limitation of the process to the superficial layers of the mucosa was more pronounced.

The mucous membrane of the body of the uterus was extremely thin. In many places there was no stroma or covering epithelium visible. No tuberculous nodules were seen in it. None were present in the myometrium.

Both tubes were thickened and irregularly nodulated and densely adherent to the ovaries. No tubercles were visible on the peritoneal surface. On cross section of the nodules at the isthmie portions, the wall was seen to be greatly thick-



Fig. 1.

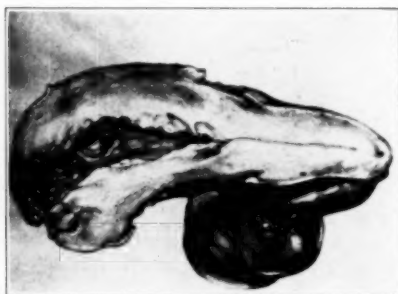


Fig. 2

ened and yellowish grey in color. The lumen was not dilated. In the ampullary portion there was a similar thickening of the walls, but the lumen was dilated. One section showed a large area of caseation. Microscopic examination showed the appearances we associate with a healing tuberculous process. There were very few typical giant cell systems. In several areas, especially in the region of the ampulla, the mucous membrane was healthy looking. In other areas there was epithelial hyperplasia. In the region of the isthmus there was the typical appearance of salpingitis isthmica nodosa. Caseation was present on the left side.

The ovaries were cystic. They did not contain any foci of tuberculosis.

Comment.—A case of tuberculosis of the mucous membrane of the cervical canal, occurring in a nulliparous woman of thirty-eight years of age, with no previous history of tuberculosis, but with definite evidence of tuberculosis of the tubes

which was evidently of longer standing than that present in the cervix. A study of the literature shows that in 75 to 80 per cent of cases of tuberculosis of the cervix there is associated tuberculosis of the upper genital tract. In this case there is no direct continuity of the tuberculous process in the tubes and in the cervix, the endometrial and muscular wall of the uterus being free from disease.

It is generally believed that the tubercle bacillus usually enters the body by the respiratory or the alimentary channels, and thence reaches other systems. Often, as in this case, there may be no clinical evidence of this first invasion but in 42 per cent of the recorded cases lung tuberculosis was present.

The possibility of infection from a husband with tuberculosis epididymitis must be considered. There is no evidence of such in this case.

620 WEST ONE HUNDRED AND SIXTY-EIGHTH STREET

DISCUSSION

DR. WALTER T. DANNREUTHER.—One of the most interesting features is the absence of pathologic change in the endometrium although there is tuberculous involvement of both cervix and adnexa. During the past ten years I have seen 3 cases of tuberculosis of the cervix. In the first instance, a virgin of forty-two consulted a radiotherapist, and this physician asked me to see the patient after he had treated the cervix with radium, and the irradiation failed to control the bleeding. He had made a clinical diagnosis of carcinoma and was mystified by the fact that the biopsies (he had taken three) showed only chronic endocervicitis. I subsequently did a complete hysterectomy and found that although there was no evidence of tuberculosis on the peritoneal surface, the entire mucosa of the tubes and endometrium showed caseous tuberculosis with definite necrosis of the tubercles. Any possibility of the diagnosis of tuberculosis of the cervix that might have been made from a biopsy before the radium therapy was begun had been lost. In the second case a woman of forty-three presented herself complaining of a bloody discharge for the previous six weeks. Her husband had died three months previously of pulmonary tuberculosis. The biopsy from this cervical lesion is the only one in which I have ever seen both a typical histopathologic picture of tuberculosis and the tubercle bacilli demonstrated. I also did a complete hysterectomy in this case, and was surprised to find no evidence of tuberculosis elsewhere in the uterus, tubes, or ovaries. In both of these patients, physical examination, plus a roentgenogram of the chest, failed to disclose tuberculosis anywhere else in the body.

Assuming that the migration of a tuberculous infection is usually either hematogenous or downward through the ostium of the tube, I could not explain the primary tuberculosis of the cervix in the second patient on either basis. It seemed logical to assume that it might have been a contact infection acquired from the husband.

I had a third patient with tuberculosis of the endometrium and endocervix, with a peculiar history. She had been operated upon two years previously for removal of a tuberculous tube and ovary. One year later she was operated upon again by the same surgeon for removal of the other tube and ovary. Six months thereafter she began to bleed. She then came under my observation, and having recently visited Weibel's clinic in Vienna (Weibel sees a great deal of pelvic tuberculosis) and having been impressed by his statements regarding the virtues of irradiation in these cases, and the patient having refused a third laparotomy, I deliberately treated her with radium and the bleeding stopped. She has now been under observation for seven years with complete arrest of the metrorrhagia. This bleeding had apparently originated in a tuberculosis of the endometrium.

DR. HIRAM N. VINEBERG.—I have seen only one such case. The diagnosis was doubtful because the anterior part of the cervix was very much involved and several examinations of the discharge failed to show any evidence of tuberculosis. The patient was thirty-eight years of age and had had 9 children. Two years before coming to the hospital she had a severe attack of some pulmonary trouble from which she completely recovered. She remained well until three weeks before coming to the hospital when she had been in bed with fever and pain in the lower part of the abdomen. On examination there was found an enlarged uterus, corresponding to about the seventh or eighth week of gestation, with a mass the size of a hen's egg behind the uterus, which was fixed, and the left tube was somewhat thickened. She had not menstruated for two months and it was a question whether or not there was an early pregnancy. I did a complete hysterectomy. It was a very difficult case; there were many adhesions which were very vascular, and the patient was in very bad condition. She died of shock six hours after the operation.

The question I would like to raise is this: Does Dr. Watson claim his was a primary case of tuberculosis of the cervix, or does he think that it was more likely due to descent of the infection from the tubes? I ask that question, because in the majority of cases of cervical tuberculosis, the infection arises higher up, either in the tube or the peritoneum. Dr. Watson has very correctly said that there are very few cases of primary tuberculosis of the cervix. At that time I went through the literature very thoroughly and was able to find only 9 cases of what were considered primary tuberculosis of the cervix.

In regard to the second case spoken of by Dr. Dannreuther, I would like to say that in view of the fact that the tuberculosis was limited to the cervix, I really do not know why he thought it necessary to remove the uterus, because in cases in which the evidence is pretty strong, that the tuberculosis is primary in the cervix, amputation of the cervix usually effects a cure, and there are several cases on record in which the patients for years afterward have had no recurrence.

DR. G. L. MOENCH.—In view of the fact that tubercle bacilli were not found and that the infection of the tubes was separated from the cervical lesion by intact endometrium, one would have to think of the possibility of a syphilitic infection of the cervix. The microscopic picture of the two diseases may be identical. I do not think we can make a definite diagnosis unless one or the other of the characteristic organisms are found.

TEMPORARY SURGICAL STERILIZATION WITH SUBSEQUENT PREGNANCY*

ALBERT H. ALDRIDGE, B.S., M.D., F.A.C.S., NEW YORK, N. Y.

AN ATTEMPT to define indications for sterilizing women by surgical means almost invariably leads to controversy. This is inevitable, since differences of opinion are based on moral and religious convictions, as well as on the merits of individual cases from the physical standpoint.

It is not the purpose of this report to define indications for sterilization, but rather to describe the technic of a plastic operation whereby temporary sterilization of a patient was effected, and to suggest certain conditions for which such a procedure might be of value.

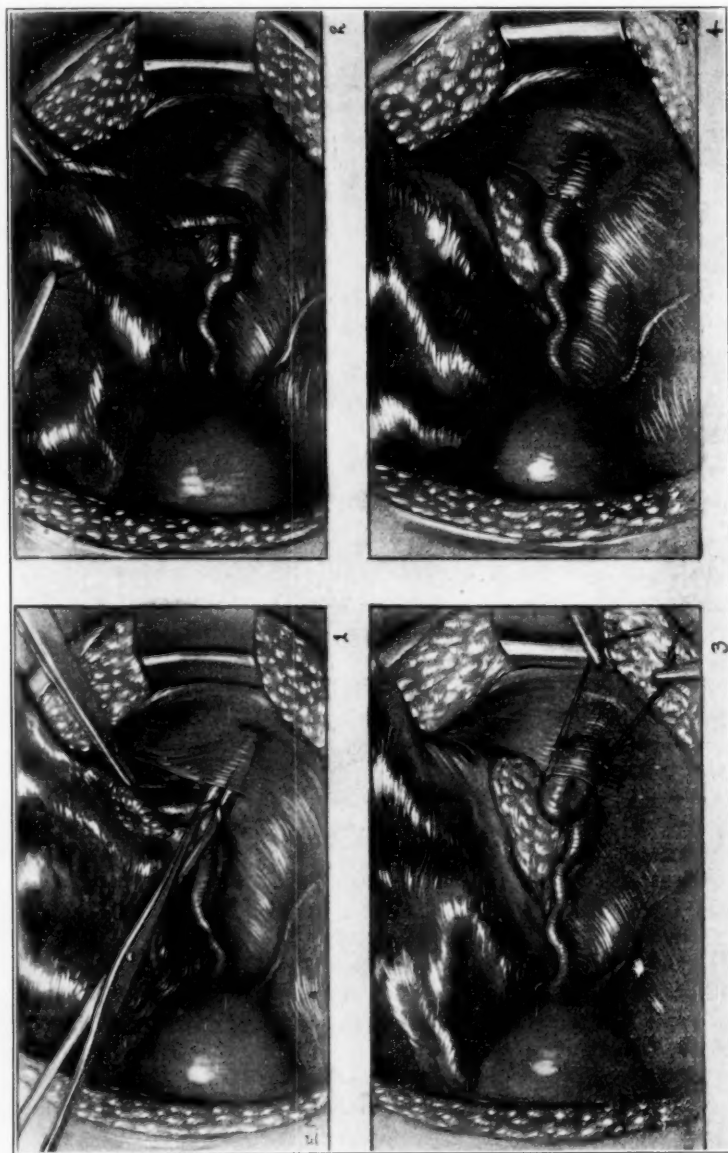
Mrs. D. B., twenty-six years of age, white, married five years, had had one full-term normal child after a stormy pregnancy, a prolonged difficult labor, and a forceps delivery. She had had 4 spontaneous abortions at two to three months and, when first seen, in 1925, was bleeding from retained secundines. The patient had never been very sturdy, and was extremely nervous, anemic, and underweight, almost to the point of emaciation. Although she had no manifest signs of existing acute or chronic disease, medical consultants strongly advised against pregnancy until her general health was decidedly improved. The husband demanded sexual satisfaction, but refused to use, or allow to be used, any mechanical or chemical means of contraception. The patient was happily married, and her greatest ambitions in life were to be well, and to protect her marriage. She was loath to repeat the experience which she had had with her first pregnancy, and, as she had never been well during her five years of married life, begged to be sterilized. On account of her age, twenty-six years, and lacking evidence of any existing definite chronic disease, the possibility of temporary sterilization was considered. The patient had a retroverted uterus which was causing backache, pelvic pain, and excessive menses, and which may have been the cause of her repeated abortions. Undoubtedly her poor physical condition was, in part, due to these abortions, and to consequent loss of blood.

As the abdomen was to be opened for correction of the uterine displacement it was decided to sterilize the patient by a temporary procedure. At operation the uterus was curetted, a Gilliam operation for retroversion was done, and the patient was sterilized by the technic shown. Fig. 1 shows the abdominal end of the tube detached from the mesosalpinx, for a distance of about 2 cm. This mobilization was necessary in order that the fimbrie end might be buried beneath the peritoneum of the broad ligament. A pocket to receive the fimbrie end of the tube beneath the peritoneum was then made, with a blunt clamp, as near as possible to the mesosalpinx, at a point selected so that the end of the tube when embedded would be under as little tension as possible. The pocket made was very superficial, just beneath the peritoneum, to avoid injury to the blood vessels of the broad ligament. The opening in the peritoneum, and the pocket in the broad ligament, were

*Read at a meeting of the New York Obstetrical Society, November 14, 1933.

made large enough to receive the fimbriated end of the tube, thereby avoiding unnecessary accumulation of serum and blood, which might damage the tube during the healing process.

Fig. 2 shows the fimbriated end of the tube being fixed in its new position by interrupted No. 0 chromic catgut sutures. The proximal margin of the opening in



Figs. 1-4.—Showing technic for temporary sterilization.

the peritoneum was fixed to the posterior surface of the tube. Two guiding sutures, placed in the tube, served to direct the end of the tube into the pocket formed in the broad ligament, and to help fix it there.

Fig. 3 shows the fimbriated end of the tube being drawn into the pocket by the two guiding sutures.

Fig. 4 shows the operation completed. The anterior surface of the tube has been fixed to the distal margin of the opening in the peritoneum, and the guiding sutures have been tied. Note that the tube was buried very superficially, just beneath the peritoneum, and not deeply between the layers of the broad ligament.

The patient made a normal recovery. Unfortunately her marriage was terminated by divorce three years after operation. In the meantime no pregnancy had occurred. The patient was soon remarried, and having failed to conceive after more than two years with the second husband, requested that the tubes be released in order that she might become pregnant.

Meanwhile, the patient's health had very much improved; her weight had increased to normal, and the same medical consultants now advised that another pregnancy would be safe. Consequently, five years after the original operation the abdomen was reopened. The uterus, ovaries, and tubes appeared normal. The fimbriated ends of the tubes, which were found securely buried beneath the peritoneum, were dissected free, and, in spite of having been buried for more than five years, appeared quite normal.

The patient then avoided pregnancy for about one year, in order to be well over the effects of the operation before conception should occur. She conceived twenty months after operation, and was delivered at term in February, 1933, of a normal child.

In the literature are recorded technics of numerous plastic operations on the tubes, devised for the purpose of sterilizing women. In the description of a technic, the author rarely fails to claim the possibility of restoring fertility as an advantage of the procedure recommended.

Restoration of fertility, after operations which have destroyed the lumina of the uterine ends of the tubes, requires either implanting the proximal ends of the tubes in the uterine cavity, or anastomosing the adjacent ends of tubal fragments. This is necessary because, by the usual technics employed for sterilization, the tubes are ligated, incised, or excised, and the ends of the fragments embedded.

All, who have been interested in the study of tubal patency in relation to sterility, realize how extremely problematical the result of such procedures are. In short, plastic operations, to restore patency of tubes in which continuity of the lumina, at the uterine ends has been destroyed, almost invariably fail.

On the other hand, experience has proved that plastic operations, to open tubes, occluded at the fimbriate ends, may succeed. Logically, therefore, any plastic operation to temporarily close the tubes, for the purpose of sterilization, should be performed upon the fimbriate ends.

The idea of temporarily sterilizing women, by extraperitoneally embedding the abdominal ends of the fallopian tubes, is not new. Technics of various operations have been described for occluding the fimbriate ends of the tubes by displacing them into the inguinal canals,^{9, 17} the vagina,^{8, 16} the layers of the anterior abdominal wall,^{4, 5, 12} the uterovesical space,^{1, 7, 11, 13, 14} the musculature of the anterior¹⁵ or posterior¹⁰

uterine wall, and finally, it has been suggested, that the fimbrie ends be buried in pockets formed by separation of layers of the broad ligament.^{3, 6, 15, 16}

From a study of the technics of the various operations, which have been recommended, one must conclude, that the only logical location in which to bury the fimbriated ends is in pockets formed in the broad ligament. Operations to embed the tubes in any of the other more distant locations recommended have two disadvantages:

1. Before the tubes can be buried in any of these other locations they must be sufficiently mobilized. This requires an extensive separation of the tubes from their mesosalpinges which destroys their nutrition. Subsequently the tubes may be released, but their blood supply can never be restored.

2. If the tubes are buried in any distant location, through the normal mobility of the sex organs they must of necessity, be at times under considerable tension. Experience has proved that as a result they may fail to heal securely in their new positions, and sooner or later may become retracted and released, thereby defeating the purpose of the operative procedure.

In view of contraceptive methods devised, and at our command, rarely, in these days, does it seem justifiable to open a woman's abdomen for the sole purpose of sterilization. Theoretically, a combination of the mechanical and chemical means at our disposal is ideal. However, the thought or practice of any of the methods yet devised is most distasteful to some women. To continue with contraceptive measures, under such circumstances, may seriously interfere with proper emotional adjustment in the sex relationship, in consequence of which we may expect well-known undesirable results on health. For such women, who must be protected against pregnancy, it seems justifiable, whenever the opportunity presents itself, to consider sterilization by surgical means.

As a result of intensive clinical and laboratory study, the physical limitations of patients, suffering from chronic systemic diseases, in relation to pregnancy and labor, are now better understood. In many of such cases, the indications to terminate pregnancy also definitely contraindicate future pregnancies. In such circumstances it seems logical to assume that the obstetrician who terminates a pregnancy, without providing a reliable and satisfactory means of contraception, has not entirely fulfilled his obligation to his patient.

Furthermore, as the effects of pregnancy on chronic diseases are better understood, the trend in obstetric practice seems to be to more frequently terminate pregnancy by abdominal hysterotomy, or cesarean section. These operations are chosen in preference to the slower more uncertain methods of induction of labor. By such procedures

the exhaustion of induced or spontaneous labor is avoided, and an opportunity is, at the same time, provided to sterilize the patient.

If the opportunity does present itself, temporary sterilization by surgical means might logically be recommended for:

1. Any woman for whom a future pregnancy is absolutely contra-indicated, but for psychologic reasons objects to, or refuses to allow, permanent sterilization.
2. Any woman suffering from an extensive chronic physical disease, such as tuberculosis, which surely for the present, and almost certainly at any future time, might be aggravated to a dangerous degree by pregnancy. If the patient's condition unexpectedly improved, so that pregnancy might be safe, restoration of fertility would be a possibility.
3. The mother who has borne as many children as are consistent with her health and means of support, but wishes to conserve the possibility of a future pregnancy in the event that illness or death claim any of her children.

SUMMARY

1. The technic of an operative procedure which temporarily sterilized a woman against two fertile husbands has been described.
2. Temporary sterilization may have a psychologic or practical value in selected cases.
3. A plastic operation on the tubes, to temporarily sterilize a woman, should be confined to the fimbriate ends. The operation should entail a minimum of trauma, bleeding, and disturbance of the normal relationship and nutrition of the structures involved. Healing and security of the procedure are insured by so placing the structures, in their new positions, as to avoid as much tension on them as possible.

33 EAST SIXTY-EIGHTH STREET

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GONORRHEAL INFECTION DURING PREGNANCY ASSOCI-
ATED WITH *TRICHOMONAS VAGINALIS*
INFESTATION

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(From the Obstetric Department of the Jefferson Hospital)

A PREGNANT woman may harbor the gonococcus in her genital tract, with or without symptoms. Recently in a special clinic of the Maternity Department of the Jefferson Hospital where routine vaginal examinations are made on the visiting prenatal patients, it has been found that a certain number of gonorrheal patients presented the following symptoms in addition to the various symptoms incident to the above infection: A profuse bubbly or foamy vaginal discharge which bathed the irritated external genitalia, and in addition, the vagina and cervix presented injected or hemorrhagic punctate spots.

Examination of the vaginal secretion diluted with warm physiologic sodium chloride solution showed vigorous motile flagellates, some isolated, and others among clumps of white cells. They were of various sizes and shapes, and presented all degrees of motility. These flagellates were identified as *Trichomonas vaginalis*. We believe the significance of this study to be of considerable importance, since many authorities believe that the gonococci are rarely, if ever, associated with trichomonas.

Following this observation, we made careful studies of all patients referred to the Special Prenatal Clinic, and to our surprise we found that it is not a rarity to find a pregnant patient with a gonorrheal infection in her genital tract who also harbors the *Trichomonas vaginalis*.

We found certain differences, as far as symptoms are concerned, in the patients suffering from *Trichomonas vaginalis* in addition to their gonorrheal infection. It is not uncommon to have a patient referred with a diagnosis of gonorrheal infection, and if a careful examination and smear had not been taken, the infestation would have been overlooked, since such patients often present very slight symptoms and very few complaints referable to the genital tract. But on the other hand, the patient who in addition to her gonorrhea has a *Trichomonas vaginalis* infestation, always presents one important complaint, a profuse and characteristic bubbly and frothy vaginal discharge which is extremely irritating.

The findings on vaginal examination in a patient with the single infection (gonorrheal) usually show mucopurulent or purulent discharge. The cervix is enlarged, tender, and usually presents a raw area around or

below the os (erosion). Bartholin's glands often show evidence of an old inflammatory process, sometimes the gonocoeccal macule may be observed, and on pressure occasionally pus may be expressed from the orifice of the duct. The urinary meatus when inspected, especially the para-urethral crypts and the openings of Skene's ducts, may show evidence of inflammation and pus may be milked from them.

In addition to the above findings, the patient who is suffering from the combined gonorrheal infection and *Trichomonas vaginalis* infestation, will always present the following: A vaginal discharge that is not as thick as in the pure gonocoeccal cases, acid in reaction, extremely irritating and productive of severe itching around the vulva. The vaginal mucous membrane is more congested and tender, and scattered throughout the vagina and on the cervix were numerous punctate injected spots.

The following tabulations were taken from carefully supervised patients who were delivered in the Maternity Ward of the Jefferson Hospital from Jan. 1, 1932, to April 30, 1933:

Number of patients delivered	1,250
Number of patients having <i>Trichomonas vaginalis</i> infestation	132 or 10.56%
Number of patients having gonorrheal infection	67 or 5.36%
Number of patients having both <i>Trichomonas vaginalis</i> infestation and gonorrheal infection	24 or 1.90%
The percentage of combined infections as compared with <i>Trichomonas vaginalis</i> infestation	18.10%

In our series of 1,250 consecutive cases delivered in the maternity ward, 132 patients showed *Trichomonas vaginalis* infestations (10.56 per cent) and only 67 patients had positive smears for the gonococci (5.36 per cent). In the entire series 24 patients showed positive smears for gonococci and were also positive for *Trichomonas vaginalis* infestation. If we compared the last figure with our entire *Trichomonas vaginalis* group, it will be found that 18.1 per cent of all *Trichomonas vaginalis* patients had the combined infections. Evidently it is not a rare occurrence to find the gonococcus together with the *Trichomonas vaginalis*.

The cases suffering from the combined infection and infestation were treated as follows: A speculum was gently inserted into the vagina and the cervix was exposed. The cervix, endocervix, and vagina were thoroughly cleansed of all vaginal secretions with liquor antisepticus, the excess being removed with cotton. Then the endocervix, cervix, and vagina were swabbed with aqueous metaphen solution 1:500 or 1:1,000. We permitted the metaphen solution to remain in contact with the tissue for five minutes; the excess being then removed with cotton. A vulvar pad was placed over the external genitalia and the patient was permitted to leave. For home use we prescribed Lugol's solution, one drachm to one or two quarts of warm water to be used as a douche

under low pressure both morning and night. The patient was cautioned to boil the bag and rubber tubing, and then use boiled water in the douche.

The treatment at the Clinic was carried out once each week and our results were most gratifying. It should be remembered that in treating such conditions there will be recurrences, but on the whole, as we emphasized before, our results were satisfactory.

2007 PINE STREET

A DEFEMINIZING TUMOR*

G. W. PHELAN, M.D.C.M., BROOKLYN, N. Y.

A TUMOR of the ovary associated with the defeminization and corresponding masculinization of the patient, is of sufficient interest to warrant this report.

Mrs. D., aged twenty years, entered the Greenpoint Hospital, Jan. 2, 1930. Her chief complaint was pain in the lower left quadrant of the abdomen, although not constant, was still very near the perception threshold; as she said, "I have only to think, to be conscious of pain." The pain was markedly increased on intercourse, this to such a degree that intercourse was dreaded.

She had never menstruated, and since marriage (two years) had never experienced a normal libido or orgasm. Also, for the last three years she had noticed that the excessive growth of hair on her body and face rendered her conspicuous. This facial growth of hair necessitated shaving three or four times a week. The patient when first seen, with the covers drawn over her body could easily have been mistaken for an adolescent male.

General examination revealed the well-marked male distribution of hair. The skeletal system was distinctly feminine. The distribution of fat certainly not characteristically feminine as evinced by the flat hips and breasts. She volunteered the information that her breasts were not as large as when she was about fifteen years old. Her voice was coarse, distinctly masculine. The conformity of her figure was on the whole feminine.

Vaginal examination revealed a well-formed introitus save the labia were smaller than normal and the clitoris markedly hypertrophied ($2\frac{1}{2}$ cm. long and $\frac{1}{2}$ cm. thick). The vagina readily admitted the examining finger. The cervix was felt, rather as a dimple than a protuberance; it was only under speculum examination that it could be identified. The uterus could not be felt. The right pelvis was negative for palpable structures or pathology. The presence of a uterus was established by passing a filiform bougie up the cervix for 2.5 cm.

Through the left fornix a small (estimated about the size of a tangerine) tumor could be felt, solid, slightly movable and decidedly tender; manipulation caused pain such as she complained of. A diagnosis of solid ovarian tumor was made but the true interpretation of the tumor was not appreciated.

A few days later the abdomen was opened and a small tumor of the left ovary revealed. This was removed after the pedicle was ligated. The uterus was small, atrophic (3 by 1.5 by 1 cm.). The right fallopian tube was a small cord and the right ovary was approximately 1 by 0.75 by 0.5 cm. The structures were so atrophic that on first thought it was decided to remove them for their museum value but they were left intact.

*Presented at a meeting of the Brooklyn Gynecological Society, March 3, 1933.

The subsequent course of this patient was remarkable. Six weeks after discharge she had a showing, i.e., two months after the operation. The following month she had a full flow and the month following, i.e., four months after operation, she became pregnant. A few months later she had a premature delivery. On April 25, 1932, she gave birth to a full-term living baby.

Examination about ten weeks postoperative showed an astounding change. Her uterus was now as nearly as could be ascertained, of normal size and the right ovary was just palpable. The cervix felt of normal proportion.

I have seen this patient off and on since this date. At the present time the most noticeable changes are in her breasts (she nursed her last baby) and in the rounding out of her figure. She tells me she has to shave but once a week and the hair on the rest of her body is of fine texture and not of such luxuriant growth as formerly. Her voice is softer but still at times a harsher intonation is noted. Her libido is normal and intercourse is without pain and orgasm is experienced. The labia are larger, no change noted of the clitoris. Despite some of the remaining stigma she is happy and conscious of her feminine self.

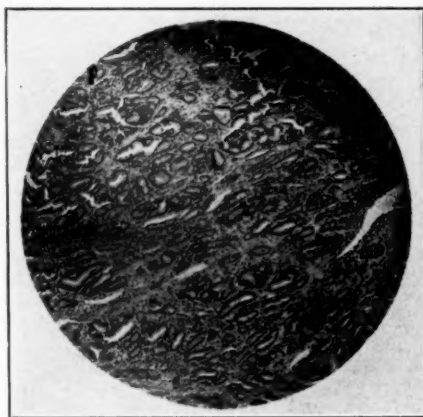


Fig. 1.

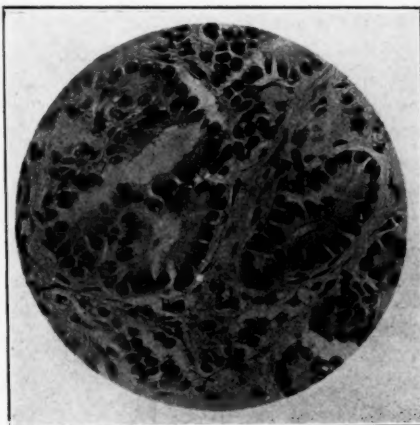


Fig. 2.

The tumor, ovoid in shape, measured 2.5 by 1.5 inches, was firm in consistency and in no way resembled an ovary. Its surface was glistening and mottled, the mottling being due to small, shallow pits or depressions; the base of these were of deep, chrome yellow color. The cut surface of the tumor appeared firm and homogeneous, with no distinguishing landmarks. The chrome yellow lining the depressions, as before noted, did not extend into the tumor. A multitude of conflicting opinions arose on viewing the microscopic sections, ranging from testicular tumor (malignant) to other varieties of benign tumors including seminoma.

The diagnosis of arrhenoblastoma (arrhenos meaning male; blastoma, to germinate) was arrived at only after a careful study of the article by Professor Robert Meyer, of Berlin, Germany. (*American Journal of Obstetrics and Gynecology* 22: 706, 1931.)

Microscopically, we find the tumor is surrounded in its entirety by a capsule composed of connective tissue from which numerous thinner segments are sent into the tumor proper, dividing it into lobules of varying sizes. In many areas these connective tissue septas have undergone hyaline degeneration. The parenchyma of the tumor is composed of glandlike spaces, varying slightly in size and shape from small, oval, to an irregular, tubular variety. The lining epithelium is composed of a solitary layer. It consists of tall, columnar epithelial cells containing a con-

siderable amount of pale staining acidophilic cytoplasm and a nucleus which is fairly large, oval, and vesicular. In some areas the lining epithelium of the gland spaces has undergone hydrophic changes. The tumor is moderately vascular.

In conclusion our diagnosis is based:

First: On the defeminizing effect of this tumor with subsequent masculinization.

Second: On the restoration of the normal feminine function on the ablation of this tumor.

Third: On its unmistakable histologic appearance.

Fourth: That a differentiation from the so-called "seminoma" is made by being cognizant of the first two points of our conclusion and the absence of leucocytic infiltration of the tumor.

My thanks are due to Professor T. S. Welton for the privilege of reporting this case, as it occurred on his service at Greenpoint Hospital, and to Dr. M. Glass, whose persistent study of the case aided us in arriving at this final diagnosis.

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DISCUSSION

DR. JAMES R. GOODALL.—I have had the privilege of seeing four arrhenoblastomas, but this one presents the most normal arrangement of cells and tubules of any that I have seen, either under the microscope or in microphotographs.

Robert Meyer classified these arrhenoblastomas into three groups, in the first of which are the typical testicular tubules, such as Dr. Phelan's case depicts, but in which Meyer states masculinization of the woman does not occur. Here is one exception. On the other hand my own case is of the atypical form, in which Meyer states that there are always sex changes, but in my case they were conspicuously absent. So that on the score of these two cases Robert Meyer's artificial subdivision, as to the presence or absence of sex change, completely collapses.

DR. SAMUEL A. WOLFE.—There are disturbances in other organs of internal secretion which produce masculinizing effects. Simple hyperplasia and tumors of the suprarenal cortex, as well as basophilic tumors of the anterior lobe of the pituitary, produce hirsuties and amenorrhea, if not external hermaphroditism. Three organs of internal secretion, therefore, overlap and can produce similar clinical manifestations.

PYOMETRA FOLLOWING APPLICATION OF RADIUM FOR CARCINOMA OF THE CERVIX*

WITH THE LATE DEVELOPMENT OF ADENOCARCINOMA OF THE
BODY OF THE UTERUS

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(From the Gynecological Service of Beth Moses Hospital)

PYOMETRA following the application of radium for carcinoma of the cervix is apparently not a very frequent complication. However, in reviewing the literature, one realizes that the condition is met often enough to warrant more careful consideration. P. B. Bland states that Alamanni found pyometra in 3.3 per cent of cervical cancers following radium therapy; Lomon found a like percentage; Sainclair 6.2 per cent; Tate 10.7 per cent; Norris in 600 cases reports 5 cases, and Polak

*Presented at a meeting of the Brooklyn Gynecological Society, March 3, 1933.

reports 7 cases. Kelly also had several cases. Bland, personally, does not believe it exceeds one-half of 1 per cent. Bartlett and Smith, in a review of 673 cases, report 19 cases of pyometra with only 2 cases secondary to radium therapy, with subsequent stenosis, an incidence of 0.69 per cent. The number of cases actually reported are few. Bland reports 3 cases, E. Bortini 1 case, J. Guyot, Jenneney and Varrin also report 1 case. The Italian, Russian and Dutch also report an occasional case.

Mrs. T. G., married, sixty years of age, was well up to 1924. She then consulted her family physician because she had been staining occasionally for the past month, on going to the toilet. She had been pregnant four times and had three living children, having had one miscarriage in 1902. She had had her menopause at forty-five years of age. There were no other symptoms and her general physical condition was good.

A provisional diagnosis of carcinoma of the cervix was made, and she was referred to Dr. H. C. Bailey of Manhattan. He made a diagnosis of squamous cell carcinoma of the cervix and instituted radium treatment. She was under the observation of Dr. Bailey and her family physician. Since there were no recurrences and the cervix was healed, she was discharged as cured after a five-year period.

In August, 1932, the patient again consulted her family physician. About six months previously she began to feel a sensation of fullness in her pelvis. This grew worse until it became a sense of weight. She also felt a dragging sensation, had increased frequency of urination, but no dysuria. Neither vaginal bleeding nor purulent discharge was present. Her weight was stationary at 165 pounds for the past few years. Her general condition was good.

With the above history she was admitted to Beth Moses Hospital in good physical condition. Abdominal examination showed a mobile mass in the hypogastric region extending to both iliac fossae. It was not tender. Introitus somewhat shrunken as result of beginning senile atrophy. Cervix small, smooth, hard, fibrotic (postradiation), high in the vault of the vagina. The uterus was the size of a 5 months' gestation, firm, somewhat irregular in outline, mobile and not tender. No adnexal masses palpated. Parametria were free and no palpable pelvic or inguinal glands.

Diagnosis.—Fibroids of the uterus.

On Aug. 18, 1932, she was operated upon. Under spinal anesthesia, the abdomen was opened with a low midline incision. The uterus was found to be the size of a 5 months' gestation, soft, cystic, and regular. On puncturing the tumor with a tenaculum forceps, about one quart of thick, chocolate-colored fluid escaped under great tension. A panhysterectomy was performed. The abdomen was closed in layers without drainage.

The patient had a prolonged convalescence due to a left parametritis, during the course of which it was found necessary to perform a colpotomy.

On October 12, the patient was discharged from the hospital in good general condition. Her temperature, pulse, and respirations were normal. No palpable pelvic exudate was present. There was scant vaginal drainage.

PATHOLOGY

Specimen consisted of a uterus, cystic in consistency, measuring 7 by 6 by 4 cm. Upon opening the uterus along its anterior wall in the usual fashion, the endometrial cavity was found to be the size of an orange (as a result of shrinkage following the evacuation of pus). Very little purulent material was found. There were also two small shreds of necrotic material. The endometrial wall was ragged and presented a honeycombed appearance with excavations varying in size from 2 to 8 mm. in diameter. The entire internal lining was markedly congested and hemor-

rhagic. In certain areas there were greenish-yellow discolorations. The bases of the excavations were composed of similar types of tissue. The myometrium varied in thickness from 1.5 to 2 cm.

Microscopic.—The wall of the uterus was much thinned out and showed innumerable scars in the myometrium with obliterated, scarred blood vessels and perivascular accumulations of lymphocytes, plasma cells and polynuclear leucocytes. Except in occasional scattered areas, the endometrium was not present. The cavity was lined by granulation tissue with hemorrhages and infiltrations of plasma cells and leucocytes. In one small area there were found a few small glandular structures with nuclear and cytoplasmic atypism and invasion of the underlying connective tissue and myometrium by single cells and strands of epithelium.

Diagnosis.—Pyometra with chronic metritis and adenocarcinoma of the body of the uterus.

COMMENT

This case illustrates the difficulties in the diagnosis of pyometra. Given a history of having received radium therapy previously, together with the development of midpelvic pain increasing in severity, pyometra should be borne in mind, especially if a globular mass is present in the suprapubic region. The cervix should be inspected and the passage of a sound attempted. If complete atresia is found the diagnosis is certain. The apparent well-being of this patient, the lack of cachexia, the normal temperature, the stationary weight are all misleading factors in the diagnosis of pyometra.

One other feature of interest in this case is the finding of an adenocarcinoma in the body of the uterus eight years following irradiation for carcinoma of the cervix. I was able to find two such cases in the literature. One reported by Bland, and the other by Bortini. The carcinoma of the body of the uterus must be considered as an independent growth. It was an adenocarcinoma whereas that of the cervix was a squamous cell neoplasm. It must also be borne in mind that the adenocarcinoma of the fundus could not have produced the pyometra since it was entirely microscopic in size, having been found only after careful examination of the wall of the uterus and then in only one section.

From this point of view it was fortunate that the uterus was not emptied from below, but that the patient was given the benefit of a hysterectomy.

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328 NEW YORK AVENUE

DISCUSSION

DR. DAVID FEINER.—We thought it best to remove the entire uterus rather than take a chance on a recurrence of this condition, in view of the faulty drainage of the lower uterine segment. The subsequent finding of carcinoma in the fundal region amply justified what might at first sight appear to have been a rather radical procedure. The one difficulty we had postoperative was a parametritis which necessitated a posterior colpotomy, and it is very likely that this could have been avoided if we had not omitted vaginal drainage at the original operation.

PYELITIS IN PREGNANCY*

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PATIENT, a white woman, twenty-four years old, para i, gravida iii, Wassermann negative. She first appeared in the antepartum clinic on May 18, approximately three and one-half months pregnant, her expected date of confinement being Nov. 4, 1933. Her antepartum course was quite negative until Oct. 11, when she was admitted to the hospital because of pain on the right side, frequency of urination and vomiting. She stated that she had a sharp sudden pain in the right lower quadrant and vomiting on the morning of admission.

On admission her blood pressure was 125/65; her blood chemistry was normal, and her urine on catheterization showed large quantities of white cells, but no clumps, no red cells, and no casts. The urine was strongly acid, specific gravity 1014, albumin 4+, and *B. coli* were grown.

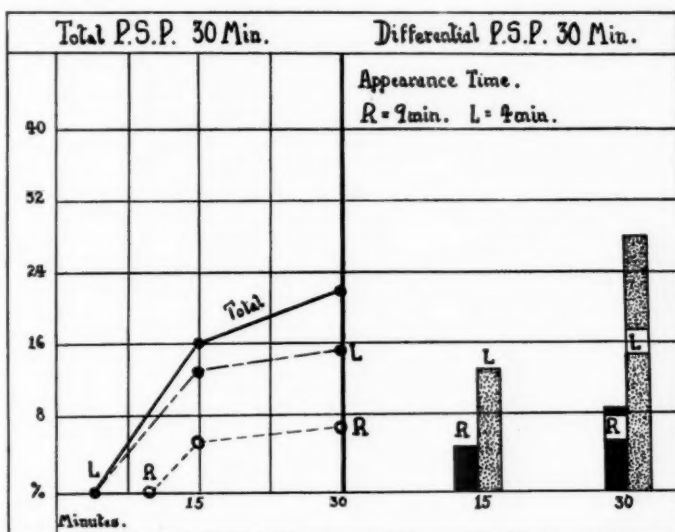


Fig. 1.

Her intake of fluids from the day of her admission was kept at 3500 c.c. or more per twenty-four hours, and her output was between 1550 and 3700 c.c.

Her hemoglobin on admission was 68 per cent and her white count 9000.

Treatment consisted of forcing fluids, soda bicarbonate 3 gm., 3 times daily, reduced iron 1 gm., 3 times daily, and high iron, high caloric, high vitamin diet.

Her temperature ranged between 99° and 102° F. during the first twelve days of her stay in the hospital.

She delivered on October 21 of a normal male infant weighing 3500 gm. Her temperature fell to normal, two days later and remained normal throughout her stay in the hospital until fifteen days after the delivery. Her hemoglobin on October 24 had risen to 78 per cent.

Investigation of kidneys and ureter was as follows:

*Read at a meeting of the New York Obstetrical Society, November 14, 1933.

October 13: A pyelogram by intravenous injection of 20 c.c. of neoskiodan (Abrodil). This pyelogram showed that the right kidney was not secreting (Fig. 1).

October 19: A differential phthalein showing that the right kidney secreted 3 per cent in fifteen minutes and 9 per cent in thirty minutes, while the left kidney secreted 15 per cent in fifteen minutes and 28 per cent in thirty minutes; also the appearance time on the right side was greatly delayed to nine minutes (Fig. 2). After the differential phthalein, visualization of the right side was done from below by neoskiodan of the right side. It took 24 c.c. of this iodine compound; the normal is about 12 c.c. This visualization showed a widening of the right ureter, a lengthening as evidenced by two curves, an S-curve and a lateral curve. The urine from the right side grew *B. coli*; that from the left side grew no organisms.

November 2: A differential phthalein showed that the right side was functioning better than on October 19. The right side now excreted 8 per cent in

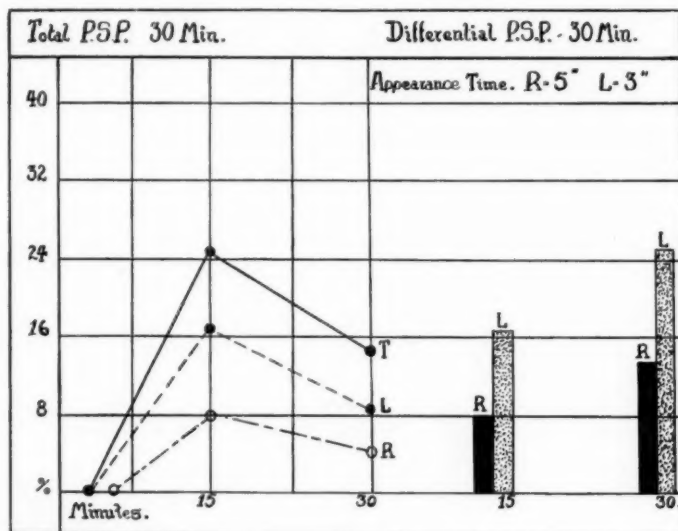


Fig. 2.

fifteen minutes and 13 per cent in thirty minutes, the left side still remained the same (normal), excreting $17\frac{1}{2}$ per cent in fifteen minutes and 26 per cent in thirty minutes.

Another visualization from below on the right side was done and this time it took 21 c.c. to fill the kidney. The picture now shows that the widening of the ureter is less, the lengthening is decidedly less; but a culture from the right side still grew *B. coli*, while the culture from the left grew no organisms.

CONCLUSIONS

1. There is a difference between pyelitis of pregnancy and other forms of pyelitis as shown by Rayer in 1841.
2. There is some degree of dilatation of the ureters during pregnancy (Siffel, 1843), which makes it hazardous to come to conclusions about ureterograms during pregnancy unless the findings are very marked.
3. Pyelitis is never "cured" during pregnancy as shown by the urine cultures and the return to normal contour of the ureters.

4. Only at three months can one accurately evaluate the status of an antepartum pyelitis. Normal drainage of the ureters, normal contour and negative cultures indicate a cure.

5. It is most important that in all cases of pyelitis we investigate the blood chemistry in order to rule out nitrogenous retention resulting from a pyelonephritis following the initial pyelitis.

6. In a case of pyelitis which does not respond to rest in bed, forcing fluids, and alkali treatment, cystoscopy is indicated. Drainage of the kidney pelvis with irrigation using 1 in 1000 silver nitrate will often relieve the condition. Cystoscopy has a definite place in the treatment of pyelitis during pregnancy.

525 EAST SIXTY-EIGHTH STREET

DISCUSSION

DR. H. F. TRAUT.—This report may sound radical, I suppose, to obstetricians who have not been accustomed to think of their patients urologically. Pyelitis of pregnancy is too often thought of merely as pyelitis and not often enough as possible pyelonephritis. If cases of so-called pyelitis of pregnancy are followed by means of phthalein excretion tests or merely by the excretion of neoskiodan injected into a vein, you can very often find evidences of kidney damage due to long-standing infection of the pelvis of the kidney which has spread out laterally into the peripelvic tissues and up into the parenchyma of the kidney. As Crabtree has so ably pointed out in a number of his publications, patients do not recover spontaneously during pregnancy, for they show positive cultures for a long time after delivery. Unless cultures are made, unless we have some idea of the origin of the condition as well as of the degree of abnormality in the genitourinary tract, I think it is very difficult to follow patients postpartum.

DR. WALTER T. DANNREUTHER.—I would suggest that these patients can be tremendously benefited by adequate drainage of the renal pelvis. This can be accomplished by passing a No. 6 ureteral catheter to the renal pelvis, leaving the first catheter in situ for from twenty-four to forty-eight hours, followed by instillations through the catheter once or twice a week of a 0.5 per cent solution of silver nitrate.

DR. BENJAMIN P. WATSON.—I think we get better results by leaving the catheters in the ureters for twenty-four hours. We have had a number of cases which did not clear up under renal catheterization, but did clear up when the catheters were allowed to remain in situ for twenty-four or even forty-eight hours.

DR. STANDER (closing).—I may say that Crabtree who has done a great deal of work in this field, has come out definitely against the use of the indwelling catheter in these cases. We have not felt the necessity in our cases. We irrigate the kidney pelvis with silver nitrate, one in one thousand solution, when indicated. Our experience with this has been excellent.

AN ABDOMINAL PREGNANCY NEAR TERM, WITH SUCCESSFUL TERMINATION, RETAINED PLACENTA, AND OBSERVATIONS ON THE POSTPARTUM EXCRETION OF PROLAN

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E J., FEMALE, gravida i, para 0, aged twenty years, married, was admitted to St. Philip's Hospital at 9:00 P.M., Nov. 24, 1932. She was referred by her physician because pregnancy of thirty-four weeks' duration was complicated by nausea, vomiting, abdominal pain, and tenderness over the entire abdomen for the past four weeks, the latter having become more severe during the past twenty-four hours.

The family history was negative. Her parents were living and well. The patient stated that she had the usual diseases of childhood, but no serious illness or operation, and no gastrointestinal symptoms until the present pregnancy. There was no history of leucorrhea or venereal disease.

Her menstrual periods commenced at the age of twelve years, and were irregular at first; but during the past five years have become regular, occurring every twenty-eight days and lasting from three to four days. Moderate discomfort occurred two days preceding the onset of the menstrual flow, but she had no pain or discomfort after the first day.

Her last menstrual period commenced March 15, 1932. Severe nausea and vomiting began about four weeks later, and the patient had to stop working. These symptoms disappeared after the sixteenth week of pregnancy, and she was comfortable until the thirty-second week. Constipation was first noticed about the time pregnancy occurred, and has persisted. Patient has taken two cascara pills daily. She has had indigestion constantly since pregnancy commenced.

Nausea and vomiting reappeared about four weeks before admission to the hospital, and at the same time her abdomen became tender, and a constant pain of mild character appeared, with a little vaginal bleeding. The abdominal tenderness became severe twenty-four hours before admission to the hospital.

Physical examination revealed an undernourished woman weighing about one hundred pounds. Her teeth were in poor condition, and the mucous membrane of her mouth was pale, dry, and fissured. The heart and lungs were normal. Blood pressure 124/68; pulse 100; respiration 26; temperature 98.6°. The abdomen was distended to about the size of a full-term pregnancy. A slight transverse depression was observed at the level of the umbilicus. The fetal heart sounds were loudest in the right upper quadrant. The fetus was above the level of the umbilicus, and in close proximity to the anterior abdominal wall. The fetal head was palpated on the right side of the abdomen, buttocks on the left side, with the longitudinal axis transverse. The patient's abdomen was tender, and there was marked increase in abdominal rigidity. Tenderness was most pronounced in the left lower quadrant. No uterine outline or contractions were observed during abdominal examination. Vaginal examination revealed a soft cervix with the canal closed. The uterus and pelvic structures could not be outlined.

Laboratory Findings.—Erythrocytes 2,550,000; hemoglobin 45 per cent; leucocytes 6,850; polynuclear cells 76 per cent; lymphocytes 24 per cent. Blood chemistry: Sugar 100 mg.; nonprotein nitrogen 26 mg.; uric acid 2.9 mg. per 100 c.c. of blood. The Wassermann reaction was strongly positive. A catheterized specimen of urine was acid in reaction; sp. gravity 1.014. It contained a trace of acetone, but otherwise it was negative.

A diagnosis of abdominal pregnancy was made because of the unusual contour of the abdomen, the close proximity of the small parts of the fetus to the anterior abdominal wall, presence of fetal heart sounds, pronounced abdominal tenderness, and inability to outline the uterus or to feel the uterine contractions. A roentgen ray examination was made later which partially confirmed this diagnosis.

Treatment.—Because of the patient's dehydration and poor condition when admitted to the hospital, fluids were forced, and she was given glucose solution, 10 per cent in normal saline 1,600 c.c. intravenously the night of admission. The next day, November 25, 1,000 c.c. of glucose solution 10 per cent in normal saline was given intravenously and normal saline 2,000 c.c. subcutaneously. She had less nausea and retained fluids by mouth after the above treatment. An attempt was made to secure a donor for blood transfusion, but the patient's family did not respond, and no money was available for a professional donor.

November 26, the day after admission, a laparotomy was done under gas and ether anesthesia and a living, normal, female child which weighed four pounds and fourteen ounces was removed from the abdominal cavity. The fetus was surrounded by a thin covering, apparently the amnion and chorion. The placenta was attached to the omentum, intestines, lateral and anterior wall of the peritoneal cavity, and apparently over the fundus of the uterus, both tubes, and the broad ligaments. No attempt was made to separate the placenta from its attachments. The umbilical cord was tied short with two ties of No. 1 chromic catgut, and the abdomen was closed without drainage.

The patient's convalescence was uneventful. Her temperature was 100.6° three hours after operation, remained below 99.6° for the next three days, and was normal after the fourth day. She had no nausea after the day of operation, no abdominal distention, and voided spontaneously. The patient was transfused with whole blood 500 c.c., two days after delivery.

The abdominal incision healed by primary union with good support. The patient had no engorgement of her breasts and the baby was given an artificial feeding and continued on bottle feedings.

This patient was kept under observation, and on Jan. 9, 1933, six weeks after operation, a blood examination showed erythrocytes 3,800,000; hemoglobin 80 per cent; leucocytes 6,800. Pelvic examination revealed a cervix soft, canal closed, uterus retroverted in the second degree, soft, and about twice its normal size. Doughy fullness was present in both sides of the pelvis, but more pronounced in the right side. Other pelvic structures could not be outlined.

Clinic Note, Feb. 17, 1933: Patient felt well, appetite was good, no nausea, weighed 102 pounds. There was a daily movement of the bowels. She had a menstrual period Jan. 22, 1933, flowed four days, and passed a small piece of tissue one inch long but very thin. The flow was slight. Slight spotting returned Feb. 5, 1933, and has continued at irregular intervals. The umbilicus was 15 cm. above the symphysis. By abdominal palpation a mass was found in the lower abdomen, on the right side extending 15 cm. above the symphysis, and on the left side 10 cm. above the symphysis. It was approximately the consistency of a three months' pregnant uterus. There was a slight brownish discharge in the vagina. The cervix was firm and closed. The uterus was palpated in second degree retroversion and was approximately the size of a large lemon. The mass palpated abdominally

was anterior to the uterus, but closely attached to it. We believe this mass represents the remains of the placenta. A flat x-ray picture was made and showed no evidence of calcification.

Since the placenta had been left in situ at operation, we realized that this case might throw some light on the question as to whether the placenta is an endocrine gland. Consequently a total of 23 rabbit ovulation tests was performed to determine the duration of prolactin excretion. The first 19 of these tests were strongly positive, starting with a specimen collected two days following the operation, and at regular intervals through January 1; a total of thirty-six days during which the patient reacted positively. Four tests done between January 2 and 10 were all negative. This would indicate that the placenta had remained viable and in contact with the maternal circulation for at least a month.

Factors which must be considered in discussing the possibility of internal secretions of the placenta, may be summarized as follows:

1. The placenta can apparently secrete estrin. Several workers^{1, 9, 10} have reported that estrin continues to be excreted following complete ovariectomy of pregnant women. This hormone must then be formed by placental tissue.

2. Patients with chorionic epithelioma and hydatidiform mole excrete both estrin and prolactin in large quantities. De Snoo³ found estrin excreted by an ovariectomized female with chorionic epithelioma.

3. Definite proof that placental tissue actively secretes prolactin is lacking. However, Reichert⁷ and Leonard⁶ have evidence to show that prolactin excreted in gravid urine differs in its biologic activity from the gonadotropic hormones of the anterior lobe of the hypophysis. This fact suggests that they arise from different sources, i.e., that possibly prolactin is formed by the placenta.

4. As long as viable placental tissue remains in contact with the circulation, the excretion of estrin and prolactin remain high. One of the most marked cases of this type has been reported by Frank.⁴ The placenta had been left in the uterus for eighteen days following delivery. When removed at that time it was apparently in a fresh condition and in contact with the maternal circulation. The blood estrin was still at a high level. The case we are reporting is, of course, a somewhat similar, but exaggerated, condition. The question could be raised, however, that these results might be due to passive storage of hormones in the placenta, with a resulting slow excretion of hormones during the time it remains. However, Zondek¹² claims that the placenta contains but from 2 per cent to 3 per cent of the total amount of prolactin existing in the blood and urine at any one time. This comparatively small quantity could probably not explain the long continued excretion of prolactin in this case. Following a normal delivery, negative tests for prolactin in the urine are obtained within seventy-two hours.¹¹ This leaves but two hypotheses tenable: either that the placenta is *causing* the excretion of the gonadotropic hormones of the anterior pituitary, or more probably, is actively *secreting* prolactin.

The delayed involution of the uterus and the failure of lactation as reported above, might well be attributed to the fact that the patient was still *physiologically pregnant* for over a month following delivery. Should another similar case present itself, the removal of the corpus luteum at operation might offer interesting results. Smith⁸ reports that the administration of estrin to lactating animals inhibits the secretion of milk. Frankl⁵ has also suppressed lactation in puerperal rats by implants of placental tissue.

In a recent case seen by us of an intraligamentous pregnancy of about eleven months' duration, the patient had felt fetal movements until five weeks prior to admission to the hospital. Five days following admission, a laparotomy was done and a macerated fetus and placenta were removed from the folds of the right broad ligament. A rabbit ovulation test performed two days prior to operation was

negative. If we consider that death of the fetus occurred five weeks prior to admission, when fetal movements were last felt, the placenta might have remained viable for as long as a month, as in the case reported above. However, since more than that length of time had elapsed before an ovulation test was made, a negative test would be expected, if the two cases are comparable.

Another patient with a left intraligamentous pregnancy was found to have a partially macerated placenta at operation. Portions of the placenta were left in place and drainage instituted. An ovulation test done six days following delivery was positive. Unfortunately no further tests were made.

SUMMARY

This case is reported because:

1. An abdominal pregnancy near term with delivery of a normal living child is rare.
2. No attempt was made to separate or remove the placenta.
3. Absorption or partial absorption of the placenta without septic temperature or drainage proves the advisability of leaving the placenta in these cases, where removal would be conducive to shock.
4. Drainage is unnecessary in clean cases.
5. Absence of engorgement of the mother's breasts, or other evidence of lactation may have been due to the presence of placental hormones.
6. The postpartum excretion of prolactin in the patient's urine was followed with the rabbit ovulation test. Positive results were obtained for thirty-six days following delivery. This finding is discussed in relation to the question of secretion of hormones by placental tissue. Results of the rabbit ovulation test in two cases of intraligamentous pregnancy are mentioned.

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828 WEST FRANKLIN STREET

GAS BACILLUS INFECTION OF THE UTERUS

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THE rarity of puerperal septicemia due to gas bacillus infection, and its attendant high mortality, warrants a detailed report of all cases encountered. Toombs, in two excellent articles, thoroughly reviews the scanty literature upon the subject, and those interested are referred to his papers. The authors will limit themselves to the presentation of the following case that recently came under their observation.

Mrs. E. W., white, aged 35, was admitted to Charity Hospital, with a complaint of vaginal bleeding. She had been married twelve years, and pregnant three times. Two pregnancies resulted in normal deliveries and were not followed by any post-partal complications. However, in 1922 the patient had a miscarriage which was followed by mild pelvic infection. She began to menstruate at the age of seventeen, had always been regular, the menstrual interval being thirty days, and the duration of the menstrual flow six days. There had never been any dysmenorrhea. The last menstrual period began July 27, 1932.

The present illness began Sept. 1, 1932, with nausea and vomiting as the initial symptoms. On Sept. 17, 1932, the vomitus became bile stained, the eyes and skin jaundiced, and uterine bleeding was noticed. The patient admitted that an abortion had been induced by a midwife. The symptoms became progressively worse, and that evening there were cramping pains in the abdomen and the patient decided to enter the hospital.

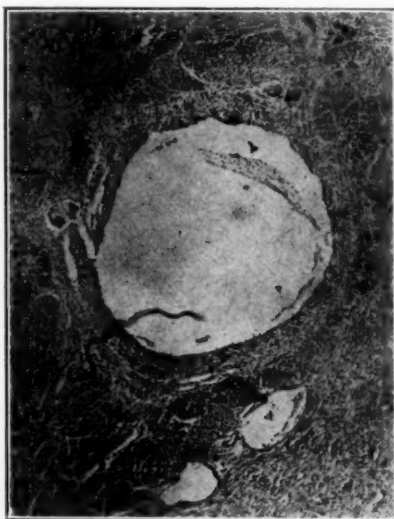


Fig. 1.—Uterine wall, showing gas bubble. Low power.



Fig. 2.—Heart muscle, showing gas bacilli. High power.

Physical examination revealed an acutely ill woman, with jaundiced conjunctivae and skin, finger tips cyanotic. Abdominal examination disclosed tenderness over the liver area, but no masses or rigidity. Vaginal examination revealed a parous vagina filled with blood clots; the cervix was soft and one finger dilated. The uterus was soft, boggy, and enlarged, and a mass was felt in each adnexal region. The reflexes were normal and there was no edema of the extremities.

Believing that the infection was probably due to *Streptococcus hemolyticus*, treatment was limited to repeated infusions and transfusions, and it was not until Sept. 23, 1932, on which date the patient became moribund and developed crepitation in the region of the right shoulder, that the true etiologic factor was suspected.

Laboratory examinations revealed the following:

Blood Chemistry.—Nonprotein nitrogen 92, urea nitrogen 41.4, creatinine 4, uric acid 5.8, blood sugar 150 mg. Blood culture: gram-positive gas producing organism. Blood count: total R.B.C. 1,280,000; total W.B.C. 17,500. Hgb. 50 per cent; differential: lymphocytes 8 per cent; monocytes 10 per cent; neutrophils 82 per cent; eosinophiles 1 per cent; basophiles 1 per cent. Urine: There was much hemolysis present. Many red blood cells found.

Clinical Diagnosis.—Septic abortion, toxic jaundice, and nephritis.

Autopsy Report.—(Dr. E. von Haam.) Body heat present, rigor mortis absent, slight lividity on the dependent portions of the body. The skin and mucous membranes, as well as the sclerae, showed a deeply icteric tinge. The arms were swollen and beefy, and on palpation distinct gas crepitation in the subcutaneous tissue could be felt. No other abnormal markings were demonstrable on the body.

On opening the peritoneal cavity, the membranes were smooth and glistening, there was no free fluid present; the omentum contained little fat, and was not adherent to the viscera. The mesenteric lymph nodes were not enlarged; the diaphragm extended to the fourth rib on the left, the fifth rib on the right.

The pericardial cavity was of normal size, the membranes were smooth and glistening, there was about 12 c.c. of clear fluid contained therein.

The heart was small in size, brownish red in color. On section the musculature was brown, friable; the endocardium was free, the valves intact.

The aorta presented a few atheromatous changes.

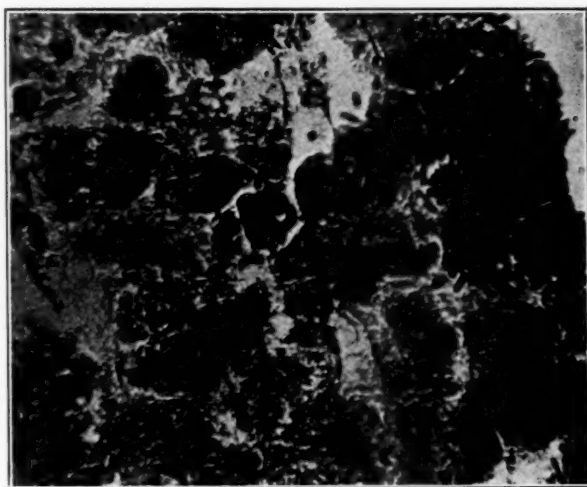


Fig. 3.—Liver, showing gas bacilli. Oil immersion.

Both lungs were voluminous and crepitant; grayish pink in color. On section a dark blackish blue cut surface was visible, with numerous gas bubbles throughout, which were larger than the alveoli and appeared to be in partly consolidated lung tissue. Dark brown fluid could be pressed from the lung.

The spleen was markedly enlarged, weighing 350 gm.; the capsule was covered with fibrinous adhesions, the organ had a pale bluish pink color, soft consistency and the cut surface showed a granular pulp which could be easily scraped with the knife.

The liver was larger than normal, weighing 2,500 gm.; the capsule was smooth and glistening, and the organ had a yellowish green color. On the surface were numerous yellowish necrotic areas, in the center of which were small gas bubbles. The cut surface showed numerous gas bubbles which gave the organ a spongy appearance.

Both kidneys were normal in size, the capsules stripped easily, the surfaces were markedly congested; the cut surface presented congested cortical zones with numerous small gas bubbles all through the organ.

The uterus was enlarged, the cervix was slightly ulcerated and patent. The mucosal membrane of the cervical canal was discolored. The uterine cavity was large and partly filled with brown gangrenous, necrotic masses which were adherent to the posterior wall of the uterus. The cut surface of the uterus revealed a gangrene of the entire mucosal membrane which extended about 3 mm. into the muscular layer. The veins of the uterus were partially thrombosed and partially patent and filled with gas. Both tubes were slightly injected but normal in size; the cut surface revealed a slightly bulging grayish mucosal membrane. The right ovary contained a fresh corpus luteum, 2 cm. in diameter. The left ovary was normal.

Anatomic Diagnosis.—(1) Gangrenous endometritis following abortion, with sepsis and gas bacillus infection. (2) Multiple areas of necrosis in liver with toxic jaundice. (3) Acute hemorrhagic nephritis.

Microscopic Examination.—Section through the heart showed cloudy swelling of the muscle fibers. The lung showed the presence of numerous bacterial colonies in the capillaries of the lung; some gas formation likewise could be observed. Section through the spleen showed numerous large necrotic areas, in the center of which gas forming bacteria could be seen. The liver showed cloudy swelling of the liver cells with numerous areas of necrosis, the center of which showed gas forming bacteria. The kidney showed marked congestion of the parenchyme with numerous small hemorrhages in the cortical zone. Section through the uterus showed a gangrene of the mucosal membrane and the presence of numerous leucocytic thrombi in the muscle wall.

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SPONTANEOUS RUPTURE OF THE UTERUS

REPORT OF THREE CASES

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(From the Margaret Hague Maternity Hospital)

THE following is a presentation of 3 cases of spontaneous rupture of the uterus complicating pregnancy, selected from a larger group which we are investigating. Preceding occurrences deemed significant as known etiologic factors are present in all three cases, and careful pathologic studies are available. The matters of history and procedure are also worthy of note because of the favorable outcome in all three cases.

CASE 1.—(Dr. S. A. Cosgrove) Mrs. H. G., aged twenty-two, was admitted Sept. 29, 1931, having irregular abdominal contractions at fifteen-minute intervals. These had begun four hours earlier.

Her past history contained one important note, a left tubal pregnancy October, 1930, treated by operation and salpingectomy.

Examination showed a normal pregnant woman. Her abdomen contained an eight and one-half months' pregnancy. A midline scar extended from the umbilicus to the symphysis pubis. The fetus was in vertex presentation, L.O.A. and the heart was normal in rate and sound. Vaginal examination showed nothing abnormal except a mucoepithelial discharge. Pelvic measurements were normal.

Labor pains continued irregular and mild for a few hours. In five hours, the pains were mild at three- or five-minute intervals and the head engaged. Seven hours after admission, the patient's condition rapidly changed. She became weak, pale, and nearly pulseless. The fetal head could not be felt by rectal touch. The onset of severe internal hemorrhage became apparent, for the pulse rapidly disappeared and no blood pressure could be recorded. The abdomen was distended and the fetal poles were not palpable. A diagnosis of internal hemorrhage from rupture of the uterus was made and the patient prepared for immediate operation.

Operation was performed by Dr. Cosgrove, although the patient was in shock, with rapid respirations, absent pulse, and blood pressure. Spinal anesthesia was used. The abdomen was full of free and clotted blood, 700 c.c. being removed. The uterus was ruptured at the left cornual site of the old operation for tubal pregnancy. The rent was over 12 cm. long and the fetus with complete membranes had been extruded into the abdominal cavity. The fetus was in rigor mortis. The conception products were removed and a subtotal hysterectomy performed.

The patient had meanwhile received 1,500 c.c. of 20 per cent glucose intravenously and operation was immediately followed by transfusion of 500 c.c. whole blood. She was subsequently given adequate treatment for shock and anemia. Recovery was uneventful after the third day and the patient was discharged seventeen days after admission.

Pathologic examination of the uterus revealed the following:

Uterus without appendages weighed 425 gm. Placenta was still attached to the uterine cavity by means of the membranes through the opening of the rupture of the left tube. Uterus measured 15 cm. in length and 15 × 10 cm. in diameter between the tubes. There was a large crater-like opening at the left cornual site. The edges of this wound were irregular. This opening extended to the middle of the fundus of the uterus and downward 5 cm. in the parametrium. There were several strong fibrous bands bridging the crater. The placenta became detached on handling. The hemorrhagic site of the placenta occupied the left anterior surface. The uterine wall averaged about 25 to 30 mm. in thickness except at the base of the rupture. Here the uterine wall was thinned out and the uterus averaged only 5 mm. in thickness. On the serous surface both posteriorly and anteriorly large number of fibrous tags were seen.

Microscopic section made at the border of the rupture showed practically no muscle tissue. It was mainly cellular scar tissue containing lymphocytes with fibrosis.

Diagnosis: Rupture of uterus at the left tube with fibrosis throughout the site of rupture.

CASE 2.—(Dr. Binder) Mrs. M. G., aged thirty-seven, gravida vi, para iv, was admitted Mar. 15, 1932 with irregular labor pains. Except for an abortion followed by curettage ten years before, the patient had always been well. Her parturitions were always attended by midwives. A week before admission she had a severe backache and bloody vaginal discharge for six hours.

Her labor pains continued sporadically for sixty hours after admission, with occasional vaginal discharge of bright blood. The latter was thought to come from a soft, thick, badly lacerated cervix. The presenting vertex was in midpelvis. The lower uterine segment was tender and eight hours later it was noted that this became marked, the pulse rate rose to 120, blood pressure dropped to 92/76, and the abdominal pains changed in character and became continuous. The cervix was only 3½ fingers dilated. Her pallor was marked, condition was poor, and the impression was that of internal hemorrhage.

Laparotomy (Dr. Binder) under spinal anesthesia revealed the abdomen full of free blood and clots, many of which were old and partly organized. The placenta was in the left lumbar gutter, and the uterus was displaced to the right by the dead fetus, which had escaped through a uterine rent. This extended from the lower uterine segment up to the insertion of the left round ligament. The fetal head was still inclosed in the layers of the left broad ligament, which had covered the site of rupture.

A supravaginal hysterectomy was performed. The adnexa were removed except for the right ovary. No drainage was employed. Adequate supportive treatment, including 500 c.c. of whole blood by transfusion, aided recovery from shock. Before and during operation the patient was pulseless, but following transfusion, improvement was definite.

Except for a slight rise in temperature on the third day, recovery was uneventful, and she was discharged on the eighteenth day postoperative.

The pathologic report of the uterus follows:

Uterus weighed 855 gm., was amputated above the cervix, measured 40 cm. in length and 13 by 10 cm. at the fundus. The left ovary and tube were attached. There was a large irregular rent extending from the cervix to the left round ligament (9 cm. in length). The wall of this rent was covered with a great deal of blood clot and was quite irregular. The lower cervical portion of the rent showed very thin edges not exceeding 2 or 3 mm. in thickness. The uterine wall otherwise averaged about 40 or 50 mm. in thickness. They were contracted. The uterine cavity was practically obliterated.

Microscopic section of the cervix showed marked disintegration at the surface of the tear. A great deal of recent hemorrhage was seen adherent to older fibrinous material with polymorphocellular infiltration. This extended into the better preserved tissue which consisted of irregular fibrosis particularly shown with special stain (Mallory aniline blue). There was considerable edema. Only in the portions more distant from this area could hypertrophied muscle cells be seen. A striking thing was the thrombosis of large veins as well as the arteries. There was one large artery which showed fibrotic edematous wall with organizing thrombus.

Pathologic Diagnosis: Rupture of uterus began at the cervix and extended to the left round ligament. Fibrosis and necrosis of cervix. Thrombosis of left parametrium.

CASE 3.—(Dr. Waters) Mrs. H. R., aged twenty-three, gravida ii, para i, admitted April 18, 1932 at the sixth month of pregnancy, because of abdominal pains and shock.

Her past history recorded scarlet fever in childhood, appendectomy in 1930 when four months pregnant, and a complicated parturition in March, 1931. On this last occasion she was admitted after forty-four hours' labor and membranes ruptured for twenty-four hours. She had been given pituitrin repeatedly, was exhausted, with partly dilated cervix and a breech presenting in the inlet. The fetus was dead. After exhibition of adequate amounts of morphine and one hundred hours labor, the breech reached the outlet and the fetus was extracted. She ran a septic course for three and one-half days, and a bilateral parametritis subsided gradually with Elliott treatments, supportive treatments, and transfusions. She was in the hospital forty-two days at that time.

Her present pregnancy was uneventful until the night before admission, when she experienced a severe spell of nausea, vomiting, and generalized abdominal cramps, with thirst and weakness. Medication by an ambulance surgeon failed to give relief, the pain and abdominal soreness became worse, and she was sent in the following morning as a case of abruptio placenta.

When seen shortly after admission, there was marked abdominal distention and exquisite tenderness over the entire uterus, with partial rigidity of the stretched out recti muscles, obvious anemia, pulse of 140, temperature of 99.6° F., some air hunger with respiratory rate of 38. There was no vaginal bleeding at any time.

A diagnosis of ruptured uterus and intraperitoneal hemorrhage was made. Immediate treatment was instituted to restore blood volume and operation was performed under spinal anesthesia.

Laparotomy (Dr. Waters) showed the peritoneal cavity full of free and clotted dark blood, and the omentum adherent over the entire uterus. A large rupture of the uterus near its left cornua and fundus was plugged by the fetal head, still covered with membranes. A portion of the placenta was partially extruding through the fundus. The laceration extended from the middle of the left broad ligament to the midfundus of the uterus. The six and one-half months' fetus with heart rate still active was removed. The uterine rent was closed with a tenaculum and a supravaginal hysterectomy with preservation of the adnexa performed. The abdomen was closed without drainage. At the conclusion of the operation 500 c.c. of whole blood was given by transfusion.

Convalescence was stormy, temperature reaching 103° on the third day, and considerable distention persisting for six days. She was discharged May 4, sixteen days after admission, apparently in good health.

The following is the pathologic report:

Specimen consisted of a uterus with adherent placenta weighing together 525 gm. No adnexa were attached. Uterus was amputated above the cervix and measured 50 cm. in length and 10 cm. in width. The cervical cavity was completely closed by the fetal membranes and was seen covered with pale mucosa. A large rent was seen taking up the most part of the anterior surface and extending between the two horns at the fundus. Through this rent the placenta was seen firmly adherent to the posterior wall. It partially extruded through the uterine rupture but nowhere could it be detached even by force. There was no sharp line of demarcation between the placenta and the uterine wall on cross-section. Over the posterior wall of the uterus a great many irregular dense fibrous tags were seen. The edges of the wound were thinned out. On cross-section obvious fibrosis was noted.

Microscopic section, stained by special methods, showed partly cellular fibrosis with hyalinization and some lymphocytic infiltration around thick-walled blood vessels. There was marked degeneration of the muscle fibers at the fundus, and definite arrangement in bundles was not seen in the lower segments of the fundus. The most striking microscopic feature was the atrophy of the deciduum. In places it was missing, and there was infiltration of chorionic villi into muscular and fibrotic areas of the wall of the uterus itself.

Pathologic Diagnosis: Rupture of uterus fundus with adherent placenta. Chronic myometritis with marked fibrosis. Atrophy of the deciduum.

Note: Further study for determination of a placenta accreta is still in progress.

ANEURYSM OF THE INTERNAL ILIAC ARTERY COMPLICATING PREGNANCY

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THE general consideration of aneurysm complicating pregnancy is of interest primarily because of the very few such cases on record. Matas, in his extensive literature on the subject of aneurysm, does not mention pregnancy with aneurysm. Reid (1926), reporting from the Johns Hopkins Hospital, had no case similar to the one being reported here. Lawson, in a careful review of the subject (1867-1912), reported eight cases of aneurysm of the ovarian and uterine arteries, including one of his own. Two of these did not, apparently, complicate pregnancy. Macé and Monier-Vinard (1907) reported a case of aneurysm of the aorta during pregnancy. MacLaren (1913) reported a patient who, three or four days after a seventy-two-hour labor and a difficult forceps delivery, developed a hard pulsating tumor in the pelvis. This was treated by tying the posterior (internal?) iliac artery. Fothergill and Dougal (1914) reported a young woman who was delivered by elective cesarean section without any previous pelvic examination. Examination three weeks postpartum revealed a pulsating tumor to the left of the uterus. Subsequently the aneurysm ruptured and autopsy revealed a sacculated aneurysm of the internal iliac artery. Cleisz and Powilewicz (1920) discussed an aneurysm of the arch of the aorta complicating pregnancy and labor. Brunner (1925) reported a young woman of twenty-five years who four weeks after a spontaneous birth developed a mass which in three months enlarged to the navel. Autopsy after rupture of the tumor revealed an aneurysm of the hypogastric artery 3 cm. below the branching of the common iliac. Gutner (1927) reported a sudden death at term due to rupture of the aorta. Böhn (1930) discussed a patient who died five days postpartum following rupture of the intima and media of the Bulbus aorta.

The case presented is one of an aneurysm of the right internal iliac artery complicating pregnancy at term.

W. G., negress, gravida iii, thirty-six years old. Her first pregnancy terminated in a four months' miscarriage in 1925. It was complicated by profuse bleeding for one week and by fever. The second pregnancy also terminated in a spontaneous four months' miscarriage and was uncomplicated.

The menstrual history was not accurate. Last menstrual period supposedly began Nov. 16, 1930 and was normal. Previous menstrual period began Oct. 27, 1930. Estimated date of confinement, Aug. 23, 1931.

The only significant details of the past history in relation to the present findings were the presence of pain in the right lower extremity for the past six years and numbness in the right leg for the last year. Neither complaint was sufficient to incapacitate the patient. There was no history of primary or secondary syphilitic lesions.

The right ankle had been swollen since Aug. 1, 1931. This edema disappeared with bed rest. Otherwise this pregnancy was uncomplicated. General physical examination revealed a well-developed and fairly well-nourished negress, weighing 115½ pounds. Pupils were irregular, right more marked than left. Heart and lungs were normal. Blood pressure was 100/70. Pulse was 80. There were no external varices. The abdomen contained gravid uterus. R. B. C. 3,100,000. W. B.

C. 9,400. Hb. 51 per cent. Urine revealed a very faint trace of albumin. Blood Wassermann: Cholesterol ++++; Noncholesterol ++++; Kahn ++++; Kline ++++.

Pelvic examination revealed a cervix which was soft, closed and short, pushed over to the left by a pulsating mass which filled the entire right lower pelvis, bulging the vagina, and extending lower than the cervix. X-ray examination revealed the fetal head lying in the extreme left side of the pelvis, apparently displaced by an intrapelvic mass. Fluoroscopy of the chest revealed a diffuse dilatation of the aorta. Fluoroscopy of the pelvis was unsatisfactory.

On Aug. 20, 1931, under oral sodium amytal, gas ether anesthesia, Dr. T. K. Brown performed a classical cesarean section. There was a mass in the right broad ligament, extending from the pelvic wall to the uterus and displacing the latter to the left. The mass was the size of an orange, spherical, cystic, tense, with an expansile pulsation in all directions and fixed. It was located just below the bifurcation of the right common iliac artery and involved the internal iliac artery and its branches. The external iliac artery coursed over the lateral anterior surface of the mass. A large varicose vein, the internal iliac, lay over the superior surface. A sulcus separated the mass from the uterus. Uterus was closed in layers. Sterilization operation was performed by removing proximal 3 cm. of each tube with a wedge from the uterus.

Diagnosis: Aneurysm of internal iliac artery, right.

The postoperative course was uneventful except for a persistent pyelitis, right. Examination sixteen days postoperatively revealed the mass present as before; definitely not smaller and with a suggestion of extending even further down than before delivery. The patient was transferred to the surgical service of Barnes Hospital where an endoaneurysmorrhaphy was performed on Sept. 25, 1931. The findings verified the diagnosis of aneurysm of the right internal iliac artery with the external iliac artery coursing over the sac. The patient died soon after operation.

SUMMARY AND CONCLUSIONS

Except for the cases of Fothergill and Dougal, and Brunner, no aneurysms of the internal iliac arteries complicating pregnancy have been reported.

Not having seen this patient prior to admission to the hospital it is impossible to evaluate the rôle that the pregnancy played in the progress of the aneurysm. However, the fact that the tumor did not involute with the general postpartum involution substantiates the conclusions of Fothergill and Dougal who contend that "after labor the uterus contracts on the vessels in its wall and the change in pelvic blood pressure is felt most strongly in the internal iliac arteries. Also, with the diminution in size of the uterus the external support is removed from the aneurysm, and it gives way in face of the relatively increased internal pressure." The presence of asymptomatic syphilis is significant.

The authors desire to express their appreciation to Dr. F. J. Arzt, who made the original diagnosis and referred the patient to this hospital.

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VOLVULUS COMPLICATING PREGNANCY

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VOLVULUS complicating pregnancy is comparatively rare. A careful search of the literature fails to reveal any cases reported in this country and only 43 have been reported abroad. At the Jewish Hospital of Brooklyn only one case occurred in over 31,000 deliveries. This case and the 43 reported make a total of 44 known cases of volvulus complicating pregnancy.

G. A., a primigravida, twenty-four years old, was first seen at the Prenatal Clinic on Nov. 17, 1932. Her last menstrual period occurred on June 4, 1932, and she was due March 11, 1933. She gave a history of lobar pneumonia with an uneventful recovery three or four years previously. The uterus was at the umbilicus; the fetal heart was heard in the midabdomen; the blood pressure was 114/58, urine examination was negative, and the weight was 129 pounds. She made three subsequent visits to the clinic on Dec. 8, 1932, Dec. 29, 1932, and Jan. 17, 1933. The blood pressure and weights recorded on these visits were respectively 110/60, 106/64, 100/60, 133, 135, and 138 pounds. Urinalyses were normal on all three occasions. There were no toxic symptoms at any time.

The patient was admitted to the hospital on Feb. 4, 1933 (five weeks before term) at 3 A.M. with a history of abdominal cramps of two hours' duration. Blood pressure was 155/90, urine examination negative, but she stated that she had mild, recurrent headache for the past two weeks. There was no edema of face, body, or extremities, and no history of any visual disturbance. Rectal examination revealed the cervix closed and uneffaced; the vertex was dipping well into the brim of the pelvis, the fetal heart was in the right lower quadrant and quite regular. Abdominal examination showed the uterus to be enlarged to about an eight months' pregnancy and there were mild uterine contractions occurring every fifteen minutes. Temperature, pulse, and respirations were normal.

The next morning she continued to have irregular pains. An enema given at 8 A.M. gave a clear fluid return. At four o'clock in the afternoon she vomited a moderate amount of greenish fluid and the uterine contractions at this time were described as infrequent but fairly strong. That evening the pains occurred every five to eight minutes and were fairly strong. Rectal examination showed the cervix still to be incompletely effaced but a little over one finger dilated, the head dipping well into the brim and the fetal heart in the right lower quadrant. It was thought at this time that the patient was not in active labor. The next day, Feb. 5, 1933, she developed a marked distention of the entire abdomen and vomited twice. An enema and a colonic irrigation were given without result. Contractions were still weak and irregular. Blood pressure was 128/60, temperature 99, and pulse 108. A gastric lavage brought forth a moderate amount of mucus and greenish fluid. At this time she was taking food and fluids quite well but she looked toxic. The impression was that she was dehydrated due to poor, irregular labor. A urine specimen showed a trace of albumin and three-plus acetone and diacetic acid. She was given 500 c.c. of 10 per cent glucose intravenously and morphine sulphate gr. $\frac{1}{4}$. A Harris drip was also given but without much effect on the distention.

The next day, Feb. 6, 1933, the distention was more marked, the vomiting and abdominal pain was continuous and pulse 130-140. Vaginal examination showed the

cervix completely effaced, two fingers' dilated, and the presenting part at the spines. The membranes were ruptured artificially. Dr. William Linder of the Surgical Service saw the patient at this time and his impression was that she had a diffuse peritonitis with ileus, probably due to a ruptured appendix. This was at 12:30 P.M. At 2:30 P.M. she delivered herself spontaneously of a 5 pound 8 ounce normal living female infant. The placenta and membranes were expelled spontaneously at 3 P.M. The patient was again seen by Dr. Linder immediately after delivery and his examination then revealed the postpartum uterus pushed over to the right side, marked abdominal distention, and a sausage-like fusiform mass occupying the left side of the abdomen. Dr. Linder's impression after this examination was that we were probably dealing with a strangulated ovarian cyst.

The patient was taken from the delivery table to the operating room and laparotomy revealed a considerable amount of serosanguineous peritoneal fluid, a gangrenous distended sigmoid about two feet long and twisted on itself for two and one-half turns. An immediate resection of the gangrenous gut was done. The two ends of the bowel were sutured to the parietal peritoneum. Two clamps were applied to the distal loop and left in situ. Four strips of vaselined gauze and one Penrose tube were used for drainage and the wound was closed in layers. At the time of operation, the hemoglobin was 55 per cent (Sahli), red cells 2,880,000, white blood cells 14,500, polymorphonuclears 87 per cent, and lymphocytes 13 per cent.

The immediate postoperative reaction was good. The distention was less marked; temperature was 102° F., pulse 120 and of good quality. A Levine tube was left in place and a clysis of normal saline and an intravenous of 10 per cent glucose given. The next day, Feb. 7, 1933, the temperature was 101° F., the pulse 120 and of good quality. The abdomen was softer, though still distended. There was no vomiting. The Levine tube was out. On this day one of the clamps on the distal loop of bowel was removed.

Forty-eight hours after the sigmoidectomy, the second clamp was removed and a colostomy tube was inserted. The patient's general condition was at this time fairly good. The temperature and pulse were coming down slowly and she looked better. For the first twenty-four hours following the insertion of the colostomy tube, there was some improvement in the distention but after this, drainage ceased; the distention became marked again and an ileostomy had to be performed. This was done under local anesthesia. The ileum was found markedly dilated and adherent to the parietal peritoneum. Following the ileostomy there was profuse drainage from the ileostomy tube and practically none from the colostomy tube. The temperature fluctuated from 101° to 103°, the pulse from 100 to 130, but the patient's general condition seemed to be fair.

Four days following the ileostomy, the patient developed a slight cough and examination of the chest revealed dullness, diminished breathing, and subcrepitant moist râles at the right lung base. The next day, February 15, drainage stopped completely from both tubes, the patient became very restless, the abdomen was markedly distended again and she vomited yellowish brown material in fairly large amounts. The temperature was 104° F., the pulse 150. A transfusion of 500 c.c. of whole blood was given by the direct method on February 16 and repeated on the seventeenth. In spite of this the patient's condition was much worse. On the day of the second transfusion, the colostomy wound was found discharging purulent material and there was marked herniation of several loops of ileum. The wound was packed with iodoform gauze.

The patient's condition kept getting worse, the temperature fluctuating from 104° to 105° F. in the afternoon and the pulse from 130 to 160. A continuous intravenous injection of 10 per cent glucose was instituted. On February 18, the closed ileostomy wound was probed with the finger and a new opening was thus made in

the ileum, resulting in a gush of foul smelling fecal material. In spite of fairly good drainage for about half a day, the ileostomy closed up again, the patient became exhausted, developed pulmonary edema, and in spite of all attempts at stimulation and resuscitation, she died on February 26, at 2:35 P.M.

Permission was obtained for autopsy and the following are the pertinent findings: generalized purulent peritonitis, multiple ulcerations of the intestine, especially the ileum, bronchopneumonia, necrosis of the uterus, and focal suppurative nephritis.

SUMMARY OF CASE

This was a case of intestinal obstruction due to volvulus of the sigmoid. It began at the onset of labor. The labor was prolonged and irregular, lasting almost forty-eight hours. During this time the obstruction continued to get worse, and the diagnosis was missed at first because the symptoms were masked by the labor pains. Laparotomy was done immediately after delivery and the twisted gangrenous sigmoid removed. The patient died of a generalized purulent peritonitis two weeks after operation.

135 EASTERN PARKWAY

TRAUMATIC UTEROINTESTINAL FISTULA*

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C. S., aged twenty-eight, married five months, was admitted to the Gynecological Service of Bellevue Hospital on April 14, 1933, complaining of vaginal bleeding for the past five weeks. *Previous relevant history:* Appendectomy and right salpingo-oophorectomy in 1922. Menstruation began at fourteen, recurred at regular intervals of twenty-eight days, lasted five days, moderate in amount and without pain. The last regular period was Dec. 1, 1932. One year ago, she had an induced abortion without morbidity. *Present illness:* She skipped her January, 1933, period, had two days' vaginal bleeding in the early part of March, and has bled moderately since. Two and one-half weeks before admission, a midwife inserted a catheter into the uterus for the purpose of inducing an abortion, following which the patient had intermittent bleeding. On the night of admission she developed a severe cramplike pain in the suprapubic region, felt dizzy and vomited once. (In view of her subsequent history, we are of the opinion that the patient was curetted just before admission.) Physical examination showed the patient to be acutely ill and markedly anemic. Pulse rate 120, heart and lungs negative. The abdomen was slightly distended, with some bilateral rebound tenderness but no rigidity. *Vaginal examination:* The introitus admitted two fingers; the cervix was posterior, soft, and admitted one finger. The uterus was forward, firm, tender, and the size of a two and one-half months' gestation. There was an adnexal mass in the right fornix 3 by 8 cm., the left fornix and culdesac were negative. The temperature was 103° F. and pulse 110. On the second day the temperature was 101° F., pulse 120 and for the next ten days she had normal temperature. On April 26 and 27, the temperature rose to 102° F. then was normal for the next six weeks until she was operated upon. The pulse rate was rapid throughout ranging from 110 to 120, even when the patient had normal temperature. Leucocytosis ranged from eighteen to twenty-four thousand; with 90 per cent to 92 per cent polymorphonuclears, red blood cells were 2,400,000,

*Presented at a meeting of the New York Obstetrical Society, November 14, 1933.

and hemoglobin 40 per cent. The patient vomited several times a day for the first nine days after admission, and four days after admission, feces were noticed passing through the vagina. On May 9, a bismuth enema was given and a rectovaginal fistula was reported. On May 11, the uterine cavity was investigated with a cystoscope and a black area was seen on the right posterior wall which

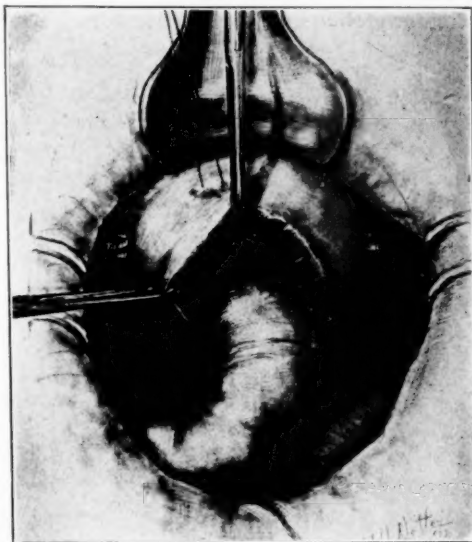


Fig. 1.—Showing loop of small intestine drawn into uterine cavity through perforated posterior wall.



Fig. 2.—Uterine cavity exposed by an incision through the anterior uterine wall.

contrasted with the surrounding red endometrium. Solution of methylene blue injected into the uterus, returned with particles of feces in it. May 15, lipiodol injection into the uterus showed two definite tracts, an upper one thought to be into the rectum, and a lower one into the vagina. The patient was seen in consultation with Dr. Robert Wadhams, and we operated upon her, June 8, 1933, eight weeks after admission.

At operation the small intestine was found attached by numerous fine adhesions to the posterior surface of the uterus. Just below the fundus a knuckle of small intestine entered the uterine cavity through a perforation of the uterus there. The right tube and ovary were missing, the left tube and ovary were

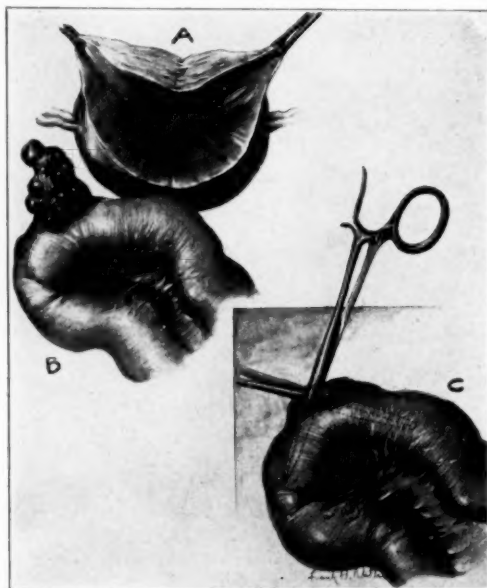


Fig. 3.—(a) Uterine cavity after detachment of the intestine. (b) Intestine after its detachment from the uterine cavity showing the extent of the intestinal perforation. (c) Same as "b" after redundant tissue has been removed.



Fig. 4.—Completion of operation. Uterine wall reconstructed and sutured; Pomeroy ligation of left tube; closure of intestinal perforation, and lateral anastomosis of intestine.

apparently normal. (We believe that the loop of intestine had been pulled through a rent in the uterus during the induction of the abortion.) There was dilatation of the proximal intestinal loop with moderate atresia of the distal loop.

Technic.—Suprapubic midline incision was made through the old scar. The uterus was freed by releasing the fine adhesions which bound the intestines to it. A stay suture was placed in the fundus, and the latter was elevated (Fig. 1). The intestines were freed from the post surface of the uterus, except at the entrance of the knuckle of gut described above. By means of both blunt and sharp dissection this was then freed and found to enter the uterine cavity, and extending to the level of the internal os. To make its removal less difficult, the uterus was opened by an excision, extending from the superior aspect of the rent in the uterus over the fundus and down the anterior surface of the uterus to the level of the bladder reflection (Fig. 2). The intestinal adhesions were then freed by sharp dissection (Fig. 3). The resulting hole in the intestine after being freed of the uterine remnants, was sutured through and through and closed over by a layer of Lembert sutures. The distal and proximal intestinal loops were then united by a lateral anastomosis, using the conventional technic. The uterine incision was closed with chromic catgut and the left tube ligated and severed by the Pomeroy technic (Fig. 4). A one point suspension suture was placed through the uterus, passed through the peritoneum and tied. Two drains were placed in the culdesae and brought out of the lower angle of the wound.

The immediate postoperative course was stormy. On the first day, the temperature rose to 104° and 105° F. and pulse to 160, gradually falling to 101° F. and 120 by the end of the first week. The second, third, and fourth postoperative weeks, the temperature averaged 100° F. and pulse 110. The drains were withdrawn a little each day, starting on the fifth day and removed on the ninth day. The wound was dry and healed two weeks after operation, and the patient was discharged on the thirty-first day, at which time the abdominal wound was well healed except for a small amount of drainage at the lower angle. On vaginal examination, the uterus was found forward, of limited mobility, but not tender. The adnexal regions were negative and the cervix clean.

59 EAST FIFTY-FOURTH STREET

DISCUSSION

DR. HENRY ARANOW.—I happened to see a similar case last summer, a young Spanish woman who had had an abortion performed, came into the hospital with a high temperature and marked signs of pelvic infection. After she had recovered from the infection a rectovaginal fistula was diagnosed, but after careful study we found that feces were coming from the uterus. Under anesthesia we traced the fistula high up in the posterior uterine wall. I was afraid to inject lipiodol, because I was fearful that I might force some of the feces into the tube or into the free peritoneal cavity. We are very conservative in our hospital on the gynecological service, and did nothing. The fistula was gradually improved and after a couple of months it closed up completely.

PYOMETRA OF CERVICAL STUMP IN A CASE OF ARTHRITIS*

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(From the Department of Gynecology and Obstetrics of New York University and Bellevue Hospital Medical College)

BESIDES being rare in our experience, i.e., the only case of pyometra of the stump in more than the last 26,000 gynecologic admissions to Bellevue Hospital, this case has brought up several points of interest to those of us who are working with arthritides.

In the past eight years of gynecologic work in the Arthritis Clinic of the Hospital for the Ruptured and Crippled, one of our most interesting problems has been to exactly locate the point where the pelvic focus persisted. We have seen many patients not relieved by supravaginal hysterectomy when the focus was apparently in the uterus or adnexa, and many not relieved by a high amputation of the cervix uteri where the focus seemed cervical.

Possibly this case suggests one reason why we have seen these disappointing results, and why we have had most satisfaction from complete removal of the entire uterus in suitable cases of arthritis.

In an article published in 1927, C. H. Mayo and C. F. Dixon recommended removal of a residual cervix, in cases where abdominal pain or chronic arthritis persisted after supravaginal hysterectomy. We proceeded, according to their recommendations, in the case presented here: E.D., married, aged forty-two, U. S., admitted to the Gynecological Service of Bellevue Hospital, February 2, 1932, complaining of pain and swelling in the left knee and general joint pains, duration one week.

Her family history was irrelevant, but her past history showed a supravaginal hysterectomy and bilateral salpingo-oophorectomy in 1917 for pelvic inflammatory disease. No recurrence of symptoms for which it was done.

Gravida iii, para none, three self-induced abortions, last 1915, no complications. Menstruation began at eleven, always irregular of four to six days' duration but no bleeding since 1917. Syphilis one year ago, one six-week course of treatment while in jail. Denied intercourse over period of four months.

Physical examination revealed an enlarged and tender left knee joint held in flexion, an old midline suprapubic scar, tapering vagina with small conical cervix about two inches long. No fundus uteri, adnexal masses or tenderness were palpable in pelvis. A yellow vaginal discharge was twice negative for gonorrhea.

In aspirating the knee joint, 35 c.c. of turbid greenish yellow fluid was obtained, which contained considerable fibrin; 30 c.c. of air was replaced. Culture was negative. The Orthopedic Department diagnosed case as infectious arthritis.

One week later, she was operated upon vaginally under spinal anesthesia to remove a probable focus in a cystic cervix. Exposure was obtained by a lateral episiotomy, and the cervix, about two inches long, was pulled down, the mucous membrane being reflected on all sides. At the upper end of this cervical stump, a large pus pocket was discovered, holding between 5 and 10 c.c. of yellow odorless fluid pus. As the surrounding tissues were firmly adherent and the sac

*Presented at a meeting of the New York Obstetrical Society, November 14, 1933.

friable, the upper wall of the cavity could not be removed in toto so was swabbed with phenol and alcohol, and cigaret drains were inserted before closing the vaginal mucosa with interrupted sutures. Similar sutures were used to close the episiotomy.

Preoperative diagnosis, arthritis and chronic cervicitis, postoperative, arthritis and pyometra of uterine stump.

Culture from the pus showed *Staphylococcus aureus*.

The knee continued painful with some inflammatory thickening but no more fluid. It was stretched under a general anesthetic and put up in plaster cast in full extension.

After several months of physiotherapy following removal of the cast, the patient was able to walk and left the hospital in July.

She appeared for reexamination a year after her discharge, and is working every day in a hotel as a chambermaid.

Her knee has given her no pain since leaving the hospital, but the motion in the joint is limited.

Her pelvic examination revealed no thickening which could be inflammatory. Her syphilis had been cleared up.

SUMMARY

1. This comparatively large collection of pus at or in the upper end of a cervical stump some years after operation, indicates that similar smaller collections would be easier to miss.

2. This may have been a true pyometra in the remains of the uterine cavity or the abscess formation may have been associated with an old parametrial infection as in intramural abscess of the uterus.

3. A similar condition might follow supravaginal hysterectomy for fibroids where the cervix is apparently perfectly innocuous.

130 EAST FIFTY-SIXTH STREET

DISCUSSION

DR. FREDERICK C. HOLDEN.—I think it is of interest that women with so much pus in the pelvis, in different locations in the cervix, the parametrium, and the tubes themselves may present an arthritis which is attributable to the genital tract. I personally can recall only 2 of 3 cases which could possibly be attributed to that cause. I certainly do not think that the fact that you occasionally find a patient similar to Dr. Barrows', justifies the doing of a complete hysterectomy in preference to supravaginal hysterectomy. I do think, however, that if one is operating upon a patient with arthritis with the idea in mind of eliminating a focus of infection, the operation should be very extensive and thorough.

STERILIZATION BY TRANSPLANTING THE UTERINE END OF THE TUBES

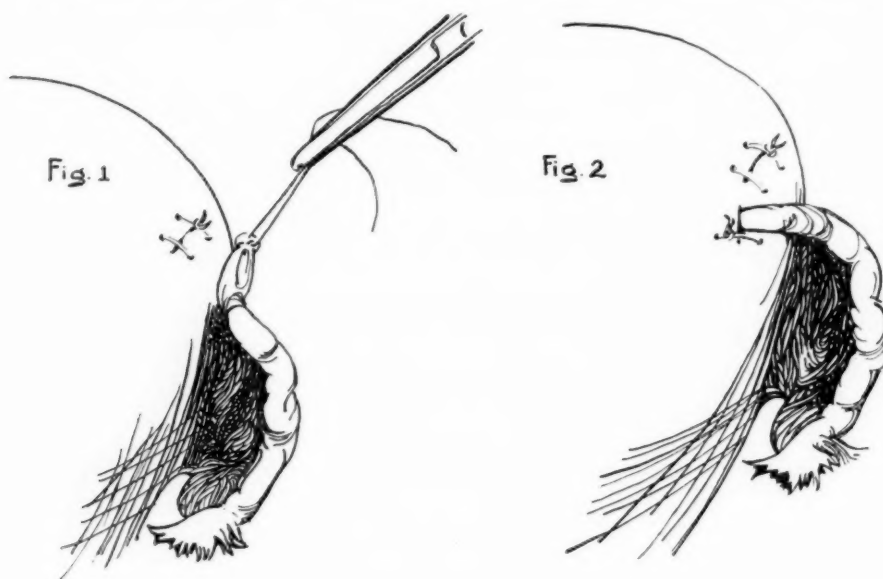
J. MORRIS SLEMONS, M.D., LOS ANGELES, CALIF.

A PROCEDURE employed consistently for ten years may not be called new, but the lack of novelty should be compensated by a more mature estimate of its value. Briefly summarized this method of sterilization consists of a simple surgical procedure in two steps, namely, excision of the proximal end of both tubes

and their implantation in the uterine muscle. The technic which facilitates smoothness and speed will be described in detail.

The tube is grasped with forceps near the uterus and the translucent mesosalpinx exposed in a favorable light to demonstrate clearly the position of the blood vessels. A small round needle carrying chromic catgut from 6 to 8 inches in length is passed through the mesosalpinx within the uterotubal angle and as near both structures as vascularization permits. The tube is firmly tied leaving the ligature-ends approximately equal, a detail of some importance since this material will be used again for suturing. Moderate traction is made on the ligature and the tube severed by an incision tangential to the uterus. Ideally, the uterus itself is not included in the incision and the mesosalpinx is not penetrated.

No amount of care will serve to prevent rather free bleeding from the denuded uterine area, less than 1 cm. in diameter, where the tube was severed. Anticipating



this contingency a suture already at hand will be placed promptly to compress the vessels and approximate the edges of the peritoneal surface of the uterus (Fig. 1).

The second step is to make a stab 1 cm. deep at a convenient point, generally on the anterior but sometimes on the posterior aspect of the uterus. Before the stab is made, a suitable spot is selected for it by trial of one location or another where the mobilized end of the tube will reach without undue traction. Now, one of the ends of the catgut ligating the tube is threaded on a small, round needle, passed from the bottom of the stab and brought out on one side. Similarly, the other end of the ligature is passed through the opposite side of the stab from within outward. And finally, while an assistant pushes the amputated end of the tube into position, the suture is tied approximating the edges of the wound and burying the ligated tissue securely in the wall of the uterus (Fig. 2).

This procedure promises an effective sterilization and really gives double assurance of that result. First, the healing of the cornual wound seals the tubal lumen. And, in the second place, ova swept into the tube with the current induced by the ciliated epithelium of the fimbriated extremity are led into a culdesac and perish there.

The patients whom I have treated by this method were either delivered by cesarean section or aborted in early pregnancy for therapeutic reasons; the abdominal route was purposely selected to afford the opportunity for sterilization.

The insufflation test to determine the efficiency of the method has been omitted deliberately because the gas pressure employed might blow open the cornual scar, even if the peritoneal covering had sealed the tubal lumen satisfactorily.

Although I have used the method routinely for a decade, it has not been given wide publicity as I assumed other methods were found satisfactory by those who use them. In conversation with Doctor Robert L. Dickinson some years ago I endorsed this procedure in reply to his query as to what were the best means of effecting sterilization, and he has referred to it casually in a recent manual on the *Control of Conception* (Williams and Wilkins, Baltimore, 1931). Renewed interest in the subject at present is responsible for my decision to describe the procedure explicitly.

819 PACIFIC MUTUAL BUILDING

PLAUT-VINCENT'S INFECTION OF THE VAGINA

A CASE REPORT

E. R. MUNTZ, M.D., CINCINNATI, OHIO

(From the Contagious Division of the Cincinnati General Hospital and the Department of Pediatrics, College of Medicine, University of Cincinnati)

VAGINITIS caused by the fusiform bacillus and spirilli organisms of Plaut-Vincent is rare. The following case is briefly summarized:

G. S., a white female of thirty years, was admitted to the Contagious Department of the Cincinnati General Hospital on May 14, 1933, with a chief complaint of "sore mouth," which had been present for three weeks. She was referred to the hospital because of laryngeal and esophageal obstruction. The onset of pain in the mouth was associated with considerable salivation and the patient noticed that the mucous membranes of her mouth were unusually red. The inflammatory process apparently subsided to some extent during the first week, following the use of salt water mouth washes, but later it became more severe and extensive. For one week prior to admission she was almost unable to swallow, felt as if she were choking, and could open her mouth only with a great deal of pain. In addition to the above complaints there were present a sore throat and enlarged and painful cervical lymph nodes. There were no symptoms referable to the genitourinary tract. The family history and past medical history had no bearing on the present illness.

Examination upon admission revealed a fairly well-developed and nourished white female of thirty years of age who was acutely ill. She could only slightly open her mouth and any attempt at examination of it was obviously extremely painful. All the upper teeth were absent but the lower ones were in a fair state of repair. The entire mucous membrane of the mouth, tongue, and pharynx was acutely inflamed and covered with a grayish white membrane which upon removal revealed a raw, bleeding surface. Salivation was profuse and the patient swallowed with considerable difficulty and with much pain. The anterior cervical lymph nodes were moderately enlarged and tender to touch but no fluctuation could be determined. Examination of the lungs, cardiovascular system and abdomen revealed nothing abnormal. The introitus and vaginal mucous membrane

were acutely inflamed, and there was a profuse discharge but no ulceration or membrane formation. No abnormalities of the pelvic organs were noted at this time or at subsequent examinations, and the cervix was not eroded or lacerated.

Smears taken from the mouth at the time of admission and stained with methylene blue and Gram's stain showed large numbers of fusiform bacilli and spirilli organisms together with many pus cells, mucus, cellular detritus and scattered bacteria of various sorts. Vaginal smears were also positive for the Vincent's organisms although the fusiform bacilli were much less in evidence than in the mouth smears. In addition, a hanging drop preparation made from the vaginal discharge demonstrated many motile spirilli. At the time of admission the leucocyte count was 6,900 per cubic millimeter of blood with 63 per cent neutrophils, 35 per cent lymphocytes, and 1 per cent each of eosinophiles and basophiles. On the following day the leucocyte count was 7,100. A voided specimen of urine contained many clumps of pus cells in the uncentrifuged specimen. Tests for albumin, sugar, and blood were negative.

On the day of admission 0.3 gm. of neoarsphenamine was given intravenously and the same dose was repeated in four days. The mucous membranes of the mouth were painted three times daily with a solution of arsphenamine in glycerin. Two days after admission the pain and salivation had greatly lessened and at the end of the fifth day only a small amount of exudate remained on the under surface of the tongue. Evidences of the inflammatory process and the remaining exudate had completely disappeared on the eighth day after admission and the patient stated that her mouth felt perfectly normal. Smears taken from several places in the mouth at this time were negative for the fusiform and spirilli organisms. The inflammatory process in the introitus and vagina also lessened, and the discharge became mucopurulent in character and much less profuse, until on the eighth day only a mild redness of the introitus and a minimal mucopurulent discharge remained. No local applications or douches were used in treating the vaginitis. Repeated smears taken from the vagina on the thirteenth day were negative for the Plaut-Vincent's organisms. The patient was discharged from the hospital fourteen days after admission apparently cured.

The literature upon this subject has been reviewed in an article by Jump and Sperling¹ published in 1932. Since this time, Mandry² reported a case of fusospirochetal infection of the vagina.

SUMMARY

1. A case of vaginitis due to infection with the fusiform bacillus and spirilli organisms is reported.

2. It is of some interest that in the majority of the cases reported, other parts of the body, usually the mouth, were also infected with the Plaut-Vincent's organisms.

REFERENCES

- (1) *Jump, H. D., and Sperling, J. S.*: J. A. M. A. 98: 219, 1932. (2) *Mandry, O. Costa*: Porto Rico J. Pub. Health & Trop. Med. 7: 455, 1932.

POCKET IMPLANTATION OF THE ROUND LIGAMENTS

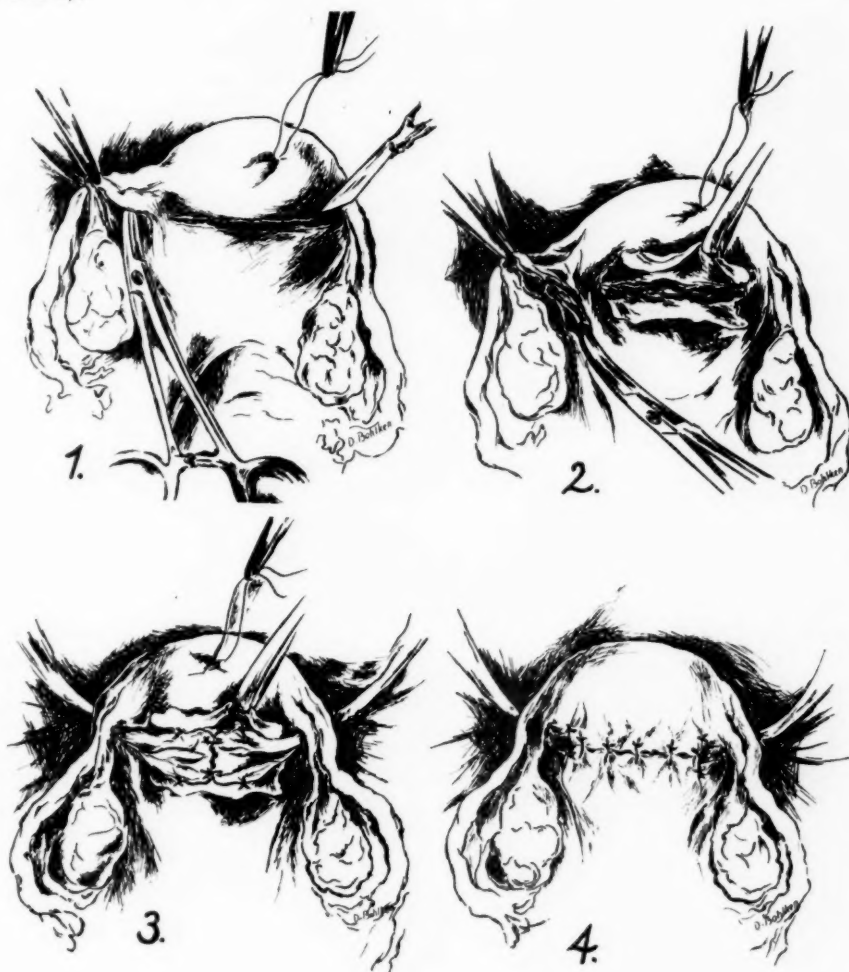
CHAS. W. DOUGHTIE, M.D., F.A.C.S., NORFOLK, VA.

ONE must be impressed with the comfort and satisfaction experienced by the patient and with the surgical end-results that follow a properly done Baldy-Webster operation. Particularly is this true in women who subsequently bear children.

Curtis, Culbertson and others fan out the loops of the round ligaments and suture them on to the surface of the posterior wall of the uterus.

The following technic has been used by me for some years and has been most satisfactory:

1. A traction suture is placed in the fundus temporarily for lifting and steadying the uterus. This suture is made to bite in at two points to give a firm hold (Figs. 1 and 2).



2. Select a transverse area beginning on a line with the lower margin of the uterine attachment of the ovarian ligament on one and extending to a like point on the opposite side. Along this area a transverse incision is made about 3 mm. deep (Fig. 1).

3. Dissect up a pocket-flap above the transverse incision about 1.5 to 2 cm., and dissect down a pocket-flap below the transverse incision of similar size. The flaps should include 2 or 3 mm. of muscle below peritoneal covering. Should one prefer, a vertical incision about 2 to 2½ cm. long may be made at each end of transverse

incision; a broad H. This perhaps makes the dissection slightly less difficult. Otherwise it makes no material difference whether one undermines a pocket above and below, or makes the two flaps (Fig. 2).

4. A six-inch curved Ochsner hemostat is then shoved through the avascular area, below the ovarian ligament, near the uterus, from behind forward. The hemostat is then made to pick up the round ligament and drags it through the broad ligament, taking care to prevent undue twisting of the included round ligament. The loop is then caught with two Allis clamps, spread out in fan shape and the procedure is repeated on the opposite ligament. The two ligaments are then sutured loop to loop into the floor of the denuded posterior wall of the uterus. About equal tension should be made on each ligament, so that the uterus may be well and evenly suspended in the midpelvis. Sutures are of No. 1 chromic gut so placed as to include only a part of the thickness of each ligament and to take a firm bite into the uterine muscle. They should not be tied tightly enough to strangulate (Fig. 3).

5. The two flaps or pockets are then sutured over the embedded round ligaments, preferably with No. 0 chromic gut, either an interrupted or running suture may be used (Fig. 4).

The advantages: The fanning out gives a broader sling or hammock. The selected area of implantation, with the broad sling, prevents overhanging or underslinging of the fundus as was prone to happen when the old Baldy-Webster method was carried out, depending on the low or high placement of the ligaments.

There is ample mobility of the fundus, laterally or forward, but not backward. The security of the implantation is obviously greater. When completed all is well covered and protected.

Pregnancy and labor are not interfered with.

There is an absence of the forward tug experienced and consciousness of lumps complained of so frequently, following the forward suspensions.

When advisable, the above procedure may be supplemented by any one of the usual methods of shortening the uterosacral ligaments commonly in use.

215 MEDICAL ARTS BUILDING

INTRAPARTUM RUPTURE OF THE UMBILICAL CORD*

NELSON B. SACKETT, M.D., F.A.C.S., NEW YORK, N. Y.

RUPTURE of the umbilical cord has been occasionally reported, usually in the form of a complete separation at the navel, placenta, or in the intervening portion, usually resulting in the death of the fetus. Absolute or relative shortening of the cord, precipitate labor, cord tumors and varices, and operative trauma are the most frequent causes. Incomplete rupture or bursting of the cord is a rare complication, which in the case to be reported, led to distressing complications in the delivery.

Case Report.—Mrs. M. B., aged thirty-seven, gravida iii, was due on Feb. 24, 1933. The first confinement in 1918, after an eleven-hour labor, resulted in a

*Presented to the New York Obstetrical Society, November 14, 1933.

difficult forceps delivery of a 9 pound, 10 ounce boy. The cervix and perineum were badly torn, and the patient had severe bladder trouble for a considerable period of time. The second labor in 1919, resulted in a forceps delivery of a 7 pound, 4 ounce boy, with a recurrence of inability to void urine.

Physical examination revealed a short, stocky woman with a male habitus. The pelvis gave the impression of being fairly large but funnel-shaped. The pelvic floor showed a healed laceration, and the cervix was high, posterior, and deeply scarred by a healed stellate laceration.

After a normal pregnancy the patient spontaneously ruptured the membranes and began labor at 7:30 A.M., Feb. 10, 1933, and entered the Woman's Hospital. Examination at 10 A.M. revealed the cervix two and one-half to three fingers dilated, the canal approximately 2 cm. long, the consistency alternately soft or tough due to scar tissue. The head was floating above the brim in R.O.P. position, poorly flexed, and clear amniotic fluid was leaking from the uterus. At 2 P.M., after six hours of hard contractions every five to three minutes, lasting for forty to sixty-five seconds, the cervix was found to be four and one-half fingers dilated, with a tough, thick rim surrounding the head which now dipped into the brim but was not engaged. The fetal heart, which had previously varied between 130 and 144, now dropped to 80 with each pain, and later to 70, but recovered after the pains. At 2:40 P.M. the nurse reported the fetal heart "very slow," and this was confirmed with the patient under an anesthetic by a steady rate of 80. At operation the fetal head was found to have rotated from R.O.P. to R.O.A. position; it was partly flexed, and the vertex was 0.5 cm. below the line adjoining the ischial spines. There was very little caput, and no moulding. The cervix was fully dilated but not fully effaced and the fenestrated forceps blades were successfully applied between it and the head. As there was no advancement with two firm tractions, and as the uterus had relaxed under ether, the forceps was discarded and preparations made for version. On entering the uterus the hand encountered two loops of cord around the baby's neck, and at the same time a short loop of cord prolapsed to the vulva and was seen to be bleeding actively. Podalic version was completed with some difficulty, owing to the scarcity of amniotic fluid, but the breech extraction involved little difficulty with the after-coming head. During all this operation blood was spurting in a jet from the prolapsed cord; and the baby breathed twice in utero and a third time while the head was still in the vagina. The placenta was removed manually; and the entire birth canal examined digitally and packed with iodoform gauze. The patient had no inordinate degree of shock, and except for a colon bacillus cystitis and the usual inability to void, made an uneventful recovery, the temperature falling to normal on the sixth day.

The 7 pound, 6½ ounce female child, in spite of losing considerable blood, breathed spontaneously; but was immediately given a subcutaneous injection of 30 c.c. of whole blood from the mother. Superficial abrasions over the jaw angles healed without scarring, no signs of anemia or cerebral irritation developed; and the child is developing normally at nine months. The unusually hard cranium had very prominent parietal bosses and almost no moulding; the biparietal diameter was 10 cm., the suboccipitobregmatic 10 cm., and the bizygomatic 9.5 cm. The cord stump presented a dark red mottled surface due to subamniotic infiltration.

The cord measured 96 cm. in length and was sharply divided into two portions. The placental portion measured 56 cm. long by 0.8 cm. in diameter, and had the usual narrow, pale appearance. The fetal portion was 40 cm. long, with a diameter varying from 1.5 to 2 cm., and distinguished by the extreme tortuosity and varicosity of its blood vessels, and by massive subamniotic hemor-

rhage similar to that described on the baby's navel stump. Near the junction of the two portions, but well on the distal side, was a linear wound 1.5 cm. in length and 0.5 cm. in depth from which dark red blood was still flowing when the specimen reached the laboratory. There are no forceps pressure-marks or other signs in the neighboring cord sufficient to determine its manner of causation. Sections through this region reveal tremendous engorgement and distention of the blood vessels and a massive extravasation of red blood cells from the ruptured vein extending under the amniotic epithelium, and distorting the connective tissue elements.

The placenta presented three small succenturiate lobes on the surface of the amnion, which latter rises 5 cm. before joining the cord. Otherwise the placenta and membranes are normal.

Discussion.—In the face of such an alarming hemorrhage from the umbilical cord, with a mild degree of disproportion between the fetus and the bony pelvis, and with a uterus incompletely relaxed, delivery involved a disagreeable choice of alternatives. It was tempting to tie the cord to stop the loss of blood from the baby, but this involved the danger of the baby breathing before version and extraction could be accomplished. The second alternative of allowing the cord to bleed was chosen, and here the necessity for speed was associated with the danger of rupturing the uterus. A third alternative, cesarean section, had earlier been rejected in view of the previous obstetric history. Although it is impossible to eliminate the forceps blade as the cause of the injury to the cord, a study of the specimen points rather to spontaneous rupture due to relative shortening of the cord coiled twice around the neck, and its compression between the head and the pelvis, with consequent distention, hyperemia, friability, and varicosity of the distal half of the cord, and rupture at the weakest point.

120 EAST SEVENTY-FIFTH STREET

CHORIONEPITHELIOMA, TREATED WITH RADIUM FOLLOWED BY HYSTERECTOMY*

RALPH M. BEACH, M.D., F.A.C.S., BROOKLYN, N. Y.

MRS. J. R. was first seen by me in January, 1929. She was nineteen years old at that time and was curetted for an incomplete abortion. One year later, January, 1930, I delivered her at the Methodist Maternity of a full-term live baby. About two years later, Dec. 7, 1931, she reappeared at the office with the history of being about two months' pregnant and having stained for the past two weeks. This spotting had been increasing in amount and had on two occasions come in distinct gushes.

The uterus at this time was distinctly larger than normal, soft and boggy. A diagnosis of inevitable abortion was made and she was sent to the hospital on Dec. 16, 1931. Vaginal examination at the time revealed that the cervix was partially open and the bleeding was rather active. Under complete asepsis sterile gauze was passed into the uterus and the cervix and upper vagina were tightly packed. The following day the uterus was emptied of an hydatid mole. She ran a normal course in the hospital and was discharged on the eighth day postabortal.

Three days later she returned to the hospital with fairly active bleeding and a diagnostic curettage was performed. While the curettings at this time were suggestive, a positive diagnosis of chorionepithelioma was not made, and it was decided to await further developments.

*Presented at a meeting of the Brooklyn Gynecological Society, October 6, 1933.

Five weeks later she returned to the hospital with the history of having had reddish brown spotting the week before, and a brisk hemorrhage the day before admission. Vaginal examination revealed a normal sized uterus in the anterior position but bleeding profusely. Physical examination and x-ray pictures of the chest were negative and the blood count at this time showed 3,000,000 red cells and hemoglobin 74 per cent.

A diagnostic curettage removed some small pieces of tissue and the pathologic report read "chorionepithelioma with invasion of the muscle by Langhan and syncytial cells," which was corroborated by other examiners.

The Aschheim-Zondek test at this time was positive. Two days later, on Feb. 8, 1932, the patient received an intrauterine application of 3,600 mg. hr. of radium, screened in a 2 mm. brass capsule surrounded with 1 mm. of rubber. She had no morbidity following this procedure and left the hospital at the end of ten days with a hemoglobin of 72 per cent. The radium had been applied just seven and one-half weeks after the uterus was emptied of the hydatid mole.

Immediately upon leaving the hospital, she was referred to Dr. Myers of the Post Graduate Hospital for deep x-ray therapy. This treatment she received from Feb. 17, 1932, to Feb. 23, 1932, and it consisted of five exposures, two each to the abdomen and back and one to the perineal region.

I saw this patient from time to time in my office for the next month and she complained only of a leucorrhea which caused some pruritis about the genitalia and anal region. Vaginal examination two weeks after the last x-ray exposure revealed on the anterior vaginal wall high up, an area, about a centimeter in diameter which was apparently a superficial erosion or a burn.

On March 21, 1932, six weeks after the radium application, the Aschheim-Zondek test, physical examination, and x-ray of the chest, were negative.

The patient was readmitted to the Methodist Hospital on March 24, 1932, and prepared for operation the next day. Under spinal anesthesia, a panhysterectomy and bilateral salpingo-oophorectomy was performed.

Pathologic Examination.—The uterus was 7½ cm. long, 6 cm. wide, and 3 cm. thick. There was no gross evidence of disease. The open uterus revealed several radium burns corresponding to the location of the tubes. Section through the radium burn in the middle third of the uterine cavity showed an area of necrosis, extending into the muscle layer, and beneath this there was no evidence of chorionepithelioma. Close examination at the edge of this tissue revealed a group of cells with pale staining cytoplasm and dark single and multiple nuclei of the type found in chorionepithelioma. From the above finding, a few cells of the neoplasm still remained in the uterus and the hysterectomy was justified.

This patient had a rather stormy course for the first three days but made a good recovery and left the hospital on the fifteenth day postoperative.

For the three months following operation the patient suffered somewhat from flashes, headaches, and sweats, but these symptoms cleared up completely at the end of this period.

About Sept. 1, 1932, five months after operation, she began to suffer from rather severe bladder symptoms due to burns from radiation with an accompanying cystitis. The treatment was long and protracted, as calculi formed on the areas of ulceration. These calculi had to be crushed and the ulcerated areas fulgurated, and she did not make a complete recovery until June of this year.

I have seen her this fall and she reports as feeling perfectly well.

The pelvis and lungs are now negative at the end of eighteen months after operation.

A CASE OF OLIGOHYDRAMNIOS*

SAMUEL B. SCHENCK, M.D., F.A.C.S., BROOKLYN, N. Y.

(Associate Gynecologist, Jewish Hospital, Instructor in Obstetrics and Gynecology,
Long Island College of Medicine)

THE amount of liquor amnii at full term is between 500 and 2,000 gm. in the normal case. Less than 300 gm. is called oligohydramnios and over 2,000 gm. makes the case one of polyhydramnios.

The case of oligohydramnios about to be reported is one of premature labor, with abruptio placentae and necrosis of the amnion.

Mrs. B. S. (hospital No. 26847) was admitted to my service at the Jewish Hospital on Feb. 8, 1933, in labor. She was twenty-eight years old and had had one spontaneous abortion at the third month of pregnancy, one year prior to admis-

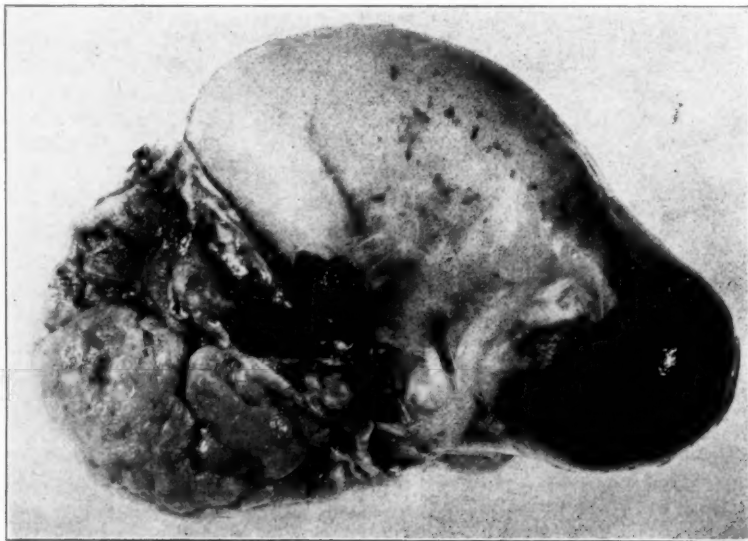


Fig. 1.—Showing fetal membranes closely approximated to body in a case of oligohydramnios.

sion. Her previous history had been entirely negative. She was admitted at 10 p.m. with strong pains every three minutes, and stated that her pains had begun about twenty hours before admission. The membranes had not ruptured. There were no toxic symptoms. Her last menstrual period had occurred on Aug. 10, 1932, so that she was in the sixth month of her pregnancy. She was in excellent general condition. Fetal heart was not heard. Uterus was firm. Position could not be determined by abdominal palpation. Rectal examination revealed full dilatation of the cervix. At 10:40 p.m. there was a spontaneous delivery of a premature infant with the placenta and membranes in one pain, the membranes in contact with the fetus, there being, apparently, very little, if any, amniotic fluid. One loop of cord was around the neck; baby stillborn. The puerperium was uneventful

*Read before the Brooklyn Gynecological Society, November 3, 1933.

and the patient was discharged on the tenth day postpartum. The Wassermann and Kahn tests were negative.

Pathologic Report.—Placenta roughly oval in shape, 14 by 11 cm. Cotyledons were fairly well marked, pale pink in color and appeared more solid than usual. On section the appearance was spongy.

Microscopic.—The placental tissue appeared normal except for some fibrosis of the villi. The syncytial layer and the amnion were completely necrotic and the character of the cells could not be identified. The umbilical vessels were normal.

135 EASTERN PARKWAY

PUERPERAL GANGRENE OF THE EXTREMITIES

J. H. CUTCHIN, M.D., EASLEY, S. C.

PUERPERAL gangrene of the extremities is a rarity that few of us have seen and justifies the report of another case making the one hundred and first case reported.

The patient was twenty-one years of age, colored. The child had been delivered two days before I saw the patient, by a midwife who states that she had made no examination. This was the fourth child, with two other living children, and one miscarriage of three weeks' duration. I saw the patient on the second day on account of too much bleeding from the uterus. Fluid extract ergot was given by mouth until four drams were given over a period of two days. On the fourth day the patient complained of pain in the lower left iliac region which ran down the left leg. On the fifth day the toes began to have no feeling but were normal in appearance. Pain was present also in the right iliac region and extended down the right leg at this time. On the sixth day the toes took on a dry, dead appearance, with a definite dry gangrene; this continuing until the twelfth day when both legs were involved to the knees. On the seventh day, the patient developed pain in the right chest. A physical examination showed a definite pneumonic condition which terminated fatally on the twelfth day. The supposition is that it was caused by an infarction.

Society Transactions

NEW YORK OBSTETRICAL SOCIETY

MEETING OF NOVEMBER 14, 1933

The following case reports were presented:

Traumatic Uterointestinal Fistula. By Dr. F. C. Holden. (See page 770.)

Pyometra of Cervical Stump in a Case of Arthritis. By Dr. D. N. Barrows.
(See page 774.)

Tuberculosis of Cervix Uteri. By Dr. B. P. Watson. (See page 736.)

Temporary Surgical Sterilization With Subsequent Pregnancy. By Dr. A. H. Aldridge. (See page 741.)

Intrapartum Rupture of the Umbilical Cord. By Dr. N. B. Sackett. (See page 780.)

Pyelitis in Pregnancy. By Dr. H. J. Stander. (See page 753.)

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF OCTOBER 5, 1933.

The following papers and discussions were presented:

The Relationship Between the Early and Late Toxemias of Pregnancy. By J. V. Missett. (See page 697.)

Routine Induction of Labor at Term. By S. M. Stern. (See page 701.)

BROOKLYN GYNECOLOGICAL SOCIETY

MEETING OF MARCH 3, 1933

The following papers and case reports were presented:

A Defeminizing Tumor. Dr. G. W. Phelan. (See page 748.)

Pyometra Following Application of Radium for Carcinoma of the Cervix. Dr. A. Hirsch (by invitation). (See page 750.)

Pelvic Edema, Diapedesis, and Rhexis. Dr. J. R. Goodall, Montreal, Que. (by invitation). (See page 646.)

MEETING OF OCTOBER 6, 1933.

The following papers were presented:

Chorionepithelioma Treated with Radium Followed by Hysterectomy. Dr. Ralph M. Beach. (See page 782.)

Placenta Previa. Dr. Robert A. Wilson. (See page 713.)

MEETING OF NOVEMBER 3, 1933

Case of Oligohydramnios. By Samuel B. Schenck. (See page 784.)

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Selected Abstracts

Artificial Start of Labor

Löfquist: A Clinical Statistical Study of Premature Labors, *Acta obst. et gynec. Scandinav.* 11: Sup. II, 1931.

At the University Women's Clinic of Lund, between the years 1900 and 1928, there were 2,650 primiparas and 2,091 multiparas who gave birth to children weighing between 600 and 3,000 gm. Löfquist found that premature labors occurred more often in primiparas than in multiparas and especially among elderly primiparas. Among the probable causes of premature labor were polyhydramnion, oligohydramnion, placenta previa, kidney disease, preeclampsia, eclampsia, abruptio placentae, acute infections, tuberculosis, and syphilis. Abnormal fetal presentations were much more common among the premature than among the full-term children. Labor was shorter in primiparas in the premature series but the third stage was longer. Among the premature labors, the following complications were more frequent: premature rupture of the membranes, prolapse of the cord, prolapse of an arm or foot and retention of the placenta and membranes. Operative interference was necessary more often in the premature cases than in the full-term ones. The morbidity also was distinctly higher in the former cases. The fetal mortality and morbidity were higher among the premature children than among the mature ones, especially among the multiparas.

J. P. GREENHILL.

Voron and Pigeaud: A Few Observations on Directed Labor (Medical Labor of Kreiss), *Bull. Soc. d'obst. et de gynéc.* 3: 300, 1933.

The method advocated by Kreiss and called medical labor consists of artificial rupture of the bag of waters as soon as labor begins and the employment of anti-spasmodics. Voron and Pigeaud term this kind of treatment, directed labor. In addition to Kreiss's recommendations, these authors direct labor by administering pituitary extract in cases of relative inertia, provided the head is engaged and the cervical dilatation is well advanced. This technic has given the authors excellent results. They have never encountered any unfavorable effects from it.

J. P. GREENHILL.

Albrecht, H.: Indications for Digital Dilatation of the Cervix, *Monatschr. f. Geburtsh. u. Gynäk.* 91: 182, 1932.

Albrecht believes that in a large proportion of cases of prolonged labor, rigidity of the cervix is the cause of the delay. He therefore advocates manual dilatation of the cervix because after this procedure, the fetal head descends and rotates in a

normal manner. This procedure is indicated when the cervix does not dilate for four or six hours after rupture of the membranes in spite of strong uterine contractions. The technic of dilatation consists of stretching the external os with the index and middle fingers of one hand during each contraction. An attempt is made to push the cervix back over the fetal head. Where the head is firmly fixed in the pelvis, these manipulations are accomplished more readily during the intervals between uterine contractions.

Manual dilatation is generally practiced in cases of secondary rigidity of the soft parts as a preparation to rapid delivery in cases of eclampsia, prolapse of the umbilical cord, breech presentation, etc.

J. P. GREENHILL.

Weleshewa, A., Kotelnikoff, W., and Chanina, F.: The Method and Significance of the Treatment of Spontaneous Rupture of the Cervix of the Uterus During Labor as a Prophylactic Against Obstetric Trauma and Its Consequences, Monatschr. f. Geburtsh. u. Gynäk. 95: 129, 1933.

Spontaneous ruptures of the cervix were observed in 17.2 per cent of all primiparas delivered in the Moscow Woman's clinic. Age is an important factor in the etiology, for tears are observed in half of the elderly primiparas. The most important factor, however, is the length of labor. The longer the labor lasts, the more frequent are lacerations. Likewise the larger the child the more numerous the tears. In cases of occipitoposterior the incidence of damage is doubled. Obstetric operations in the presence of an incompletely dilated cervix are especially productive of lacerations. Secondary atony also leads to cervical tears. The latter are nearly always associated with lacerations in the pelvic floor.

The authors advocate repair of all large perineal and cervical lacerations within the first two to four hours after labor.

J. P. GREENHILL.

Fournier, R.: The Induction of Labor By Means of Quinine and Pituitary Extract, Bull. Soc. d'obst. et de gynéc. 5: 439, 1931.

In a series of 19 cases Fournier was able to induce labor successfully 17 times by means of quinine in combination with pituitary extract. This method according to the author is absolutely safe for both mother and baby. The author generally gives 2 gm. of quinine divided into four doses unless the drug is badly tolerated. The author sees no necessity for giving large doses of pituitary extract so he administers one-quarter of a cubic centimeter every half hour. The first hypodermic is given at the same time as the last dose of quinine. The method is justified on the ground that the maximum effect of the quinine is felt between one and one-half and five hours after it is taken. The author usually gives only 1 c.c. of pituitary extract in four doses but, if necessary, 8 hypodermics or a total of 2 c.c. are administered. No hypodermics are given after regular labor pains have once begun. In case of failure, a trial is again made twenty-four hours later.

The contraindications to this procedure are: disease of the heart or kidneys, hypertension, uterine scars, abnormal presentation and cephalopelvic disproportion. The author never observed any uterine tetany or any other complication, and this he attributes to the small doses of pituitary extract he employs.

J. P. GREENHILL.

Mathieu, Albert, and Sichel, Martin S.: Further Observations On the Use of Castor Oil, Quinine and Pituitary Extract in the Induction of Labor, Surg. Gynec. Obst. 53: 676, 1931.

In a series of 320 cases in private practice, the castor oil, quinine, and pituitary extract method of induction of labor was successful in 96.6 per cent of the cases.

Induction caused no increase in the maternal mortality, the maternal morbidity, the fetal mortality, or fetal morbidity. It was most successful when the head was engaged and the cervix effaced.

The method was apparently not responsible for any pathologic conditions during labor, delivery or the puerperium. In the last 120 inductions, quinine was not used and the results were apparently the same.

In this series of 320 cases there appeared no basis for the fear some hold that the use of pituitary extract in the induction of labor causes separation of the placenta. In this number of cases, which include most of those cases that promise trouble (the toxemias, eclampsias, large babies, contracted pelvic outlets, etc.), the maternal morbidity and the fetal mortality were surprisingly low; in fact, it appears that in this series the induction saved much maternal morbidity and several fetal lives.

WM. C. HENSKE.

Morimoto: Relation Between the Action of Quinine in the Rabbit Uterus in Situ and the Suprarenal Capsule, Jap. J. Obst. & Gynec. 15: 432, 1932.

The author found that quinine accelerates the contractions of the uterus in a normal rabbit but has no effect on the uterus of a rabbit in which the visceral nerves on both sides have been incised. Neither is there an effect on the rabbit's uterus if both suprarenal capsules are removed. Hence, the effect of quinine on the rabbit's uterus is a central as well as a peripheral one.

J. P. GREENHILL.

Kunz, Arturo C.: The Diagnosis of Rupture of the Bag of Waters, Rev. méd. del Rosario, p. 970, November, 1932.

Kunz has been able to diagnose the presence of amniotic fluid in the vaginal vault by the alkaline reaction of the secretions found there (errors 5 per cent). The secretion is obtained by merely inserting the finger in the vaginal vault and testing the reaction with litmus paper. To be sure that the reaction is not caused by the presence of alkaline urine one grain of (capsule) sodium salicylate is administered one and one-half hours before the test is to be made. In one hour it appears in the urine and can be recognized by the violet hue obtained when the urine is mixed with perchloride of iron.

The test fails: (1) When the vaginal secretions are bloody; (2) in the presence of certain bacteria; (3) in cases of high rupture of the membranes with the escape of little fluid; (4) when much time has elapsed since the membranes ruptured.

JAMES M. PIERCE.

FitzGibbon, Gibbon: The Induction of Labour by Puncture of the Membranes, J. Obst. & Gynec. Brit. Emp. 38: 495, 1931.

Rupture of the membranes as a means of instituting labor is an old method which, according to the author, has undeservedly fallen into disrepute. In a series of 23 cases there was no morbidity and no failure of induction of labor. Only one patient, a woman with excessive hydramnios, had a latent period of sixty-four hours after rupture of membranes. The author does not believe that the bag of waters plays any part in the dilatation of the cervix since it is the presenting part alone that dilates the internal os and the cervix. He emphasizes two points in technic: rupture of the membranes at a point directly in front of the presenting part and not higher up in the uterine cavity; allowing escape of amniotic fluid until the head presses firmly against the cervix, and says emphatically that the cause of the onset of labor is "purely mechanical and results from stimulation of nervous impulses by the pressure of the presenting part of the fetus on the parametric tissue surrounding the internal os and the supravaginal portion of the cervix."

WILLIAM F. MENGERT.

Miscellaneous

Seitz, L.: **Genesis, Clinical Aspects and Treatment of Endometriosis**, Arch. f. Gynäk. 149: 529, 1932.

Seitz points out the frequency with which endometriosis is found in association with uterine myomata and emphasizes the fact that both are influenced by the action of the ovarian hormones. The diagnosis of endometriosis is justified when (1) histologic examination shows typical endometrial structure, (2) the cells show cyclic changes or a decidual reaction in the presence of a pregnancy and (3) typical menstrual bleeding.

In the absence of a microscopic picture typical for endometriomata, the diagnosis should be made if the presence of blood is evidence of cyclic hemorrhages as for example, chocolate cyst of the ovary. It can also be made if there is dysmenorrhea or other symptoms present during the menses which are evidence of tissue reactions to the menstrual process, and especially to the ovarian hormone stimulation. Hematosalpinx and chocolate cysts are often diagnosed as ectopic pregnancy when in reality they are endometrial in origin.

The author classifies endometriomata from a clinical viewpoint on the basis of 65 consecutive cases which are reviewed. He divides these tumors into three groups: (1) endometriosis interna (uterine), (2) retrocervical endometriosis with infiltration of the posterior uterine ligaments, and (3) endometriosis of the ovaries (chocolate cysts), tubes and pelvic peritoneum. He is of the opinion that the retrocervical types of endometriosis must be considered as being clinically malignant.

The symptomatology is discussed at length and special attention is called to the periodic recurrence of the symptoms, especially the dysmenorrhea and abdominal pain which precedes and accompanies the menses. A bimanual examination made just before or during the menstrual period, reveals marked tenderness which disappears during the intermenstrual period and recurs with each succeeding menses. The latter are usually prolonged, increased in frequency and amount with a corresponding decrease in the intermenstrual period.

The author condemns radiation therapy because (1) it is not always successful, (2) a full castration dose must be used, and (3) it is rarely successful in the infiltrative retrocervical types. Radiation therapy may be used in older women, or when surgery is contraindicated.

Surgery is the treatment of choice. It is usually successful and the ovarian function can in most instances be preserved. Ovarian activity is essential for endometrial activity but is not the cause of endometriosis. The author believes that patients operated upon for endometriosis must be watched for at least five years just as are carcinoma patients.

RALPH A. REIS.

Gruenstein, J.: **Tuberculosis of the Uterus**, Ztschr. f. Geburtsh. u. Gynäk. 102: 128, 1932.

Description of a case of tuberculosis of the portio, apparently primary, since no further evidence of tuberculosis was found in the patient or in the hysterectomized uterus. The gross appearance was that of a cancer crater. Infection most likely through intercourse. In a second case the tuberculous infection was diagnosed by curettement, x-ray treatment was given but bleeding continued, and examination after one-half year revealed an inoperable cancer of the cervix, which the author believes to have developed on the basis of a tuberculosis. A third case is reported starting in the tubes, spreading to the endometrium with secondary infection of the entire uterine musculature by way of the lymphatics.

GROVER LIESE.

Items

Certification of Specialists in Medicine

The present trend toward specialization in medicine with the lack of fixed minimum requirements for training and experience in special work has called attention repeatedly of late to the urgent need for official recognition and certification in the United States of fully qualified specialists in various branches of medicine.

Examining Boards have been established and functioning for several years in ophthalmology, otolaryngology, obstetrics and gynecology, dermatology, and more recently in pediatrics. Boards are now being formed in radiology and orthopedic surgery as well as in several other special branches of medicine. Physicians who are citizens of the United States and Canada are equally eligible for examination.

Each of these Boards is composed of members appointed by the nationally recognized special societies, and the related sections of the American Medical Association.

Their requirements and examinations for certification are rigid and searching and a recent editorial in the *Journal of the American Medical Association* makes the following statement:

"As information concerning the work of these Boards becomes more widely disseminated among both the medical profession and the public, their prestige must grow. Eventually the young man who wishes to make for himself a place in any of these specialties will consider the securing of a certificate by a council-recognized certifying board as the first step in such a procedure. Hospitals will also do well to be guided in their staff appointments by similar qualifications. Movements of this type necessarily develop and advance slowly. However, . . . there is reason to believe that the certifying boards will do much to advance the quality of specialistic service available to the people and to the profession of our country."

Announcement is made of the formation of the Advisory Board for Medical Specialties, previously referred to editorially by the *Journal of the American Medical Association*. The purpose of this Advisory Board is to coordinate the activities of the various official groups already concerned with post-graduate medical education in the specialties, and to standardize their methods of work and the certification of medical specialists by the existing examining boards.

It is composed of representatives from the following groups: The Association of American Medical Colleges, The American Hospital Association, The Federation of State Medical Boards of the United States, The National Board of Medical Examiners, The American Board of Ophthalmology, The American Board of Otolaryngology, The American Board of Obstetrics and Gynecology, The American Board of Dermatology and Syphilology, and The American Board of Pediatrics. Examining boards in other specialties may be eligible for representation on this Board upon meeting certain high standards of qualification.

The officers are President, Dr. Louis B. Wilson of Rochester, Minnesota; Vice-president, Dr. J. S. Rodman of Philadelphia; Secretary and Treasurer, Dr. Paul Titus of Pittsburgh, and Members of the Executive Committee, Dr. W. P. Wherry of Omaha, and Dr. W. B. Lancaster of Boston.

It is obvious that this Advisory Board for Medical Specialties should have an important influence in an advisory way on undergraduate medical education as well as graduate education in the specialties; it will assist in the active investigation and

listing of post-graduate training facilities both in the United States and Canada, and to a lesser extent abroad, so much of which has already been done in this country by the Council on Medical Education and Hospitals of the American Medical Association; and it should be an important influence in effecting a general improvement in the standards of practice in the various specialties. It has been seriously suggested that the time may soon come when the various states will license physicians to practice as specialists and that American Boards' certificates will be the basis of such a license. One province in Canada already licenses all of its specialists.

It is expected and planned that this Advisory Board for Medical Specialties will be reportable to and work under the general direction of the Council on Medical Education and Hospitals of the American Medical Association, the latter to be affiliated in a judicial capacity. The details of this affiliation have not yet been completed. Merritte W. Ireland, Surgeon-General of the United States, and Dr. W. D. Cutter of Chicago, represented the Council as observers at the recent meeting of the Advisory Board in Chicago.

The next edition of the American Medical Directory plans to publish information about the acceptable special boards as well as to indicate those physicians who are Diplomates of the Boards. Plans are likewise being formulated for the proposed publication of a Directory of Diplomates which shall also contain information regarding post-graduate training facilities, special residencies available, and general qualifications necessary for certification and such official recognition as a specialist in any given branch of medicine.

The next meeting of the Advisory Board will be held in Cleveland, Sunday, June 10, 1934, or immediately prior to the next annual session of the American Medical Association.

American Board of Obstetrics and Gynecology

Oral and General examination for all candidates in Cleveland, June 12, immediately prior to meeting of the American Medical Association. Reduced railroad rates will be available and all applicants are urged to register in the Section and attend the scientific sessions.

A dinner and Round Table Conference will be held at the Hotel Cleveland, Cleveland, on the first day of the scientific session of the American Medical Association, Wednesday, June 13, at 7 o'clock. All Diplomates are requested to be present and any physicians interested in obstetrics and gynecology are invited to attend. New Diplomates granted certificates at the examination held immediately preceding the American Medical Association Convention will be introduced individually.

For further information and application blanks for the examination apply to the Secretary, Dr. Paul Titus, 1015 Highland Building, Pittsburgh (6), Pa.